DEPARTMENT OF ENERGY

10 CFR Parts 429 and 431

[EERE–2017–BT–TP–0018]

RIN 1904–AE46

Energy Conservation Program: Test Procedure for Direct Expansion-Dedicated Outdoor Air Systems

AGENCY: Office of Energy Efficiency and Renewable Energy, Department of Energy.

ACTION: Final rule.

SUMMARY: The U.S. Department of Energy (''DOE'') is publishing a final rule to establish definitions for ''direct expansion-dedicated outdoor air systems'' (''DX–DOASes'') and ''unitary dedicated outdoor air systems'' (''unitary DOASes''). Unitary DOASes are a category of small, large, and very large commercial package air conditioning and heating equipment under the Energy Policy and Conservation Act, as amended. In addition, DOE is establishing a test procedure to measure the energy efficiency of DX–DOASes, which aligns with the most recent version of the relevant industry consensus test standards for DX–DOASes, with certain minor modifications. Lastly, DOE is adopting supporting definitions, energy efficiency metrics for dehumidification and heating modes, and provisions governing public representations as part of this rulemaking.

DATES: The effective date of this rule is August 26, 2022. The incorporation by reference of certain publications listed in the rule is approved by the Director of the Federal Register on August 26, 2022. Representations with respect to energy use or efficiency of direct expansion-dedicated outdoor air systems must be based on testing conducted in accordance with this final rule on or after July 24, 2023.

ADDRESSES: The docket, which includes **Federal Register** notices, public meeting attendee lists and transcripts, comments, and other supporting documents/materials, is available for review at *www.regulations.gov*. All documents in the docket are listed in the *www.regulations.gov* index. However, some documents listed in the index, such as those containing information that is exempt from public disclosure, may not be publicly available.

A link to the docket web page can be found at *www.regulations.gov/docket/EERE-2017-BT-TP-0018*. The docket web page contains instructions on how to access all documents, including public comments, in the docket. For further information on how to review the docket contact the Appliance and Equipment Standards Program staff at (202) 287–1445 or by email: *ApplianceStandardsQuestions@ee.doe.gov*.

FOR FURTHER INFORMATION CONTACT:

Ms. Catherine Rivest, U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Building Technologies Office, EE–2J, 1000 Independence Avenue SW, Washington, DC 20585–0121. Telephone: (202) 586–7335. Email: *ApplianceStandardsQuestions@ee.doe.gov*.

Mr. Matthew Ring, U.S. Department of Energy, Office of the General Counsel, GC–33, 1000 Independence Avenue SW, Washington, DC 20585–0121. Telephone: (202) 586–2555. Email: *Matthew.Ring@hq.doe.gov*.

SUPPLEMENTARY INFORMATION: DOE incorporates by reference the following industry standards into title 10 of the Code of Federal Regulations (''CFR'') part 431:

Air-Conditioning, Heating, and Refrigeration Institute (''AHRI'') Standard 920 (I–P) with Addendum 1, ''2020 Standard for Performance Rating of Direct Expansion-Dedicated Outdoor Air System Units,'' copyright 2021.

AHRI Standard 1060 (I–P), ''2018 Standard for Performance Rating of Air-to-Air Exchangers for Energy Recovery Ventilation Equipment,'' copyright 2018.

Copies of AHRI 920–2020 (I–P) with Addendum, and AHRI Standard 1060–2018 can be obtained from the Air-Conditioning, Heating, and Refrigeration Institute, 2311 Wilson Blvd., Suite 400, Arlington, VA 22201, (703) 524–8800, or online at: *www.ahrinet.org/*.

ANSI/American Society of Heating, Refrigerating and Air-Conditioning Engineers (''ASHRAE'') Standard 37–2009, ''Methods of Testing for Rating Electrically Driven Unitary Air-Conditioning and Heat Pump Equipment,'' ASHRAE-approved June 24, 2009.

ANSI/ASHRAE Standard 41.1–2013, ''Standard Method for Temperature Measurement,'' ANSI-approved January 30, 2013.

ANSI/ASHRAE Standard 41.6–2014, ''Standard Method for Humidity Measurement,'' ANSI-approved July 3, 2014.

ANSI/ASHRAE Standard 198–2013, ''Method of Test for Rating DX-Dedicated Outdoor Air Systems for Moisture Removal Capacity and Moisture Removal Efficiency,'' ANSI-approved January 30, 2013.

Copies of ANSI/ASHRAE Standard 37–2009, ANSI/ASHRAE Standard 41.1–2013, ANSI/ASHRAE Standard 41.6–2014, and ANSI/ASHRAE Standard 198–2013 can be obtained from the American Society of Heating, Refrigerating and Air-Conditioning Engineers, 180 Technology Parkway, Peachtree Corners, GA 30092, (404) 636–8400, or online at: *www.ashrae.org*.

See section IV.N of this document for a further discussion of these industry standards.

Table of Contents

I. Authority and Background

Small, large, and very large commercial package air conditioning and heating equipment are included in the list of ''covered equipment'' for which the DOE is authorized to establish and amend energy conservation standards and test procedures. (42 U.S.C. 6311(1)(B)–(D)) As defined by the Energy Policy and Conservation Act, as amended (''EPCA''),[1] ''commercial package air conditioning and heating equipment'' means air-cooled, water-cooled, evaporatively-cooled, or water-source (not including ground-water-source) electrically operated, unitary central air conditioners and central air conditioning heat pumps for commercial application. (42 U.S.C. 6311(8)(A)) Industry standards generally describe unitary central air conditioning equipment as one or more factory-made assemblies that normally include an evaporator or cooling coil and a compressor and condenser combination. Units equipped to also perform a heating function are included.[2] Unitary dedicated outdoor air systems (''unitary DOASes'') provide conditioning of outdoor ventilation air, normally using a refrigeration cycle consisting of a compressor, condenser, expansion valve, and evaporator, and therefore, DOE has concluded that unitary DOASes are a category of commercial package air conditioning and heating equipment subject to EPCA. An industry consensus test standard has been established for direct expansion-dedicated outdoor air systems (''DX–DOASes''), which are a subset of unitary DOASes and which are the subject of this final rule. The following sections discuss DOE's authority to establish test procedures for DX–DOASes, as well as relevant background information regarding DOE's adoption of the industry consensus test standard, and clarifications to the industry test procedure for this equipment.

A. Authority

EPCA authorizes DOE to regulate the energy efficiency of a number of consumer products and certain industrial equipment. (42 U.S.C. 6291–6317) Title III, Part C[3] of EPCA, Public Law 94–163 (42 U.S.C. 6311–6317, as codified), added by Public Law 95–619, Title IV, section 441(a), established the Energy Conservation Program for Certain Industrial Equipment, which sets forth a variety of provisions designed to improve energy efficiency. This covered equipment includes small, large, and very large commercial package air conditioning and heating equipment. (42 U.S.C. 6311(1)(B)–(D)) DOE has determined that commercial package air conditioning and heating equipment includes unitary DOASes. As discussed in section I.B of this document, this equipment has not previously been addressed in DOE rulemakings and are not currently subject to Federal test procedures or energy conservation standards.

The energy conservation program under EPCA consists essentially of four parts: (1) testing, (2) labeling, (3) Federal energy conservation standards, and (4) certification and enforcement procedures. Relevant provisions of EPCA specifically include definitions (42 U.S.C. 6311), energy conservation standards (42 U.S.C. 6313), test procedures (42 U.S.C. 6314), labeling provisions (42 U.S.C. 6315), and the authority to require information and reports from manufacturers (42 U.S.C. 6316).

The Federal testing requirements consist of test procedures that manufacturers of covered equipment must use as the basis for: (1) certifying to DOE that their equipment complies with the applicable energy conservation standards adopted pursuant to EPCA (42 U.S.C. 6316(b); 42 U.S.C. 6296), and (2) making other representations about the efficiency of that equipment (42 U.S.C. 6314(d)). Similarly, DOE uses these test procedures to determine whether the equipment complies with relevant standards promulgated under EPCA.

Federal energy efficiency requirements for covered equipment established under EPCA generally supersede State laws and regulations concerning energy conservation testing, labeling, and standards. (42 U.S.C. 6316(a) and (b); 42 U.S.C. 6297) DOE may, however, grant waivers of Federal preemption in limited circumstances for particular State laws or regulations, in accordance with the procedures and other provisions of EPCA. (42 U.S.C. 6316(b)(2)(D))

Under 42 U.S.C. 6314, the statute also sets forth the criteria and procedures DOE is required to follow when prescribing or amending test procedures for covered equipment. Specifically, EPCA requires that any test procedure prescribed or amended shall be reasonably designed to produce test results which measure energy efficiency, energy use, or estimated annual operating cost of covered equipment during a representative average use cycle and requires that test procedures not be unduly burdensome to conduct. (42 U.S.C. 6314(a)(2))

EPCA requires that the test procedures for commercial package air conditioning and heating equipment be those generally accepted industry testing procedures or rating procedures developed or recognized by the Air-Conditioning, Heating, and Refrigeration Institute (''AHRI'') or by the American Society of Heating, Refrigerating and Air-Conditioning Engineers (''ASHRAE''), as referenced in ASHRAE 90.1, ''Energy Standard for Buildings Except Low-Rise Residential Buildings'' (''ASHRAE 90.1''). (42 U.S.C. 6314(a)(4)(A)) Further, if such an industry test procedure is amended, DOE must update its test procedure to be consistent with the amended industry test procedure, unless DOE determines, by rule published in the **Federal Register** and supported by clear and convincing evidence, that such test procedure would not meet the requirements in 42 U.S.C. 6314(a)(2) and (3), related to representative use and test burden. (42 U.S.C. 6314(a)(4)(B))

EPCA also requires that, at least once every seven years, DOE evaluate test procedures for each type of covered equipment, including commercial package air conditioning and heating equipment, to determine whether test procedures would more accurately or fully comply with the requirements for the test procedures to not be unduly burdensome to conduct and be reasonably designed to produce test results that reflect energy efficiency,

[1] All references to EPCA in this document refer to the statute as amended through the Energy Act of 2020, Public Law 116–260 (Dec. 27, 2020), which reflect the last statutory amendments that impact Parts A and A–1 of EPCA.

[2] *See* American Society of Heating, Refrigerating and Air-Conditioning Engineers (''ASHRAE'') Standard 90.1–2019, ''Energy Standard for Buildings Except Low-Rise Residential Buildings'' p. 38.

[3] For editorial reasons, upon codification in the U.S. Code, Part C was redesignated Part A–1.

energy use, and estimated operating costs during a representative average use cycle. (42 U.S.C. 6314(a)(1))

In addition, if the Secretary determines that a test procedure amendment is warranted, the Secretary must publish proposed test procedures in the **Federal Register**, and afford interested persons an opportunity (of not less than 45 days' duration) to present oral and written data, views, and arguments on the proposed test procedures. (42 U.S.C. 6314(b)) If DOE determines that test procedure revisions are not appropriate, DOE must publish its determination not to amend the test procedures.

As discussed in section I.B of this document, a test procedure for DX–DOASes was first specified by ASHRAE 90.1 in the 2016 edition (''ASHRAE 90.1–2016''). Pursuant to 42 U.S.C. 6314(a)(4)(B) and following updates to the relevant test procedures referenced in ASHRAE 90.1, DOE is establishing a test procedure for DX–DOASes in satisfaction of its aforementioned obligations under EPCA.

B. Background

From a functional perspective, unitary DOASes operate similarly to other categories of commercial package air conditioning and heat pump equipment, in that they provide conditioning, normally using a refrigeration cycle generally consisting of a compressor, condenser, expansion valve, and evaporator. Unitary DOASes provide ventilation and conditioning of 100-percent outdoor air to the conditioned space, whereas for typical commercial package air conditioners that are central air conditioners, outdoor air makes up only a small portion of the total airflow (usually less than 50 percent). This conditioned outdoor air is then delivered directly or indirectly to the conditioned spaces. A unitary DOAS may precondition outdoor air using an enthalpy wheel, sensible wheel, plate heat exchanger, heat pipe, or other heat or mass transfer apparatus. Unitary DOASes are typically installed in addition to a local, primary cooling or heating system (*e.g.,* commercial unitary air conditioner, variable refrigerant flow system, chilled water system, water-source heat pumps)—the unitary DOAS conditions the outdoor ventilation air, while the primary system provides cooling or heating to balance building shell and interior loads and solar heat gain. According to ASHRAE, a well-designed system using a unitary DOAS can ventilate a building at lower installed cost, reduce overall annual building energy use, and improve indoor environmental quality.[4]

When operating in humid conditions, the dehumidification load from the outdoor ventilation air is a much larger percentage of the total cooling load for a DX–DOAS than for a typical commercial air conditioner. Additionally, compared to a typical commercial air conditioner, the amount of total cooling (both sensible and latent[5]) is much greater per pound of air for a DX–DOAS at design conditions (*i.e.,* the warmest/most humid expected summer conditions), and a DX–DOAS is designed to accommodate greater variation in entering air temperature and humidity (*i.e.,* a typical commercial air conditioner would not be able to dehumidify 100-percent outdoor ventilation air to the levels achieved by a DX–DOAS). As discussed further in section III.A.2 of this document, not all unitary DOASes have this dehumidification capability.

On October 26, 2016, ASHRAE published ASHRAE 90.1–2016, which for the first time specified a test standard and efficiency standards for DX–DOASes. ASHRAE 90.1–2016 adopted the integrated seasonal moisture removal efficiency (''ISMRE'') dehumidification efficiency metric and the integrated seasonal coefficient of performance (''ISCOP'') heating efficiency metric, as measured according to the applicable industry standard at the time (ANSI/AHRI Standard 920–2015, ''Performance Rating of DX-Dedicated Outdoor Air System Units'' (''ANSI/AHRI 920–2015'')), and defines a DX–DOAS as a type of air-cooled, water-cooled, or water-source factory assembled product that dehumidifies 100-percent outdoor air to a low dew point and includes reheat that is capable of controlling the supply dry-bulb temperature of the dehumidified air to the designed supply air temperature. ASHRAE 90.1–2016 also established dehumidification and heating standards for DX–DOASes.

The amendment to ASHRAE 90.1 to specify an industry test standard for DX–DOASes triggered DOE's obligations vis-à-vis test procedures under 42 U.S.C. 6314(a)(4)(B), as discussed previously. On October 25, 2019, ASHRAE published an updated version of ASHRAE 90.1 (''ASHRAE Standard 90.1–2019''), which maintained the DX–DOAS provisions as first introduced in ASHRAE 90.1–2016 without revisions.

On February 4, 2020, AHRI published AHRI 920 (I–P)–2020, ''Performance Rating of DX-Dedicated Outdoor Air System Units''. Following this publication, in April 2021, AHRI published AHRI 920 (I–P)–2020 with Addendum 1, ''Performance Rating of DX-Dedicated Outdoor Air System Units'' (''AHRI 920–2020''), which included one minor update to fix an error in section 6.8.2 of the previous version.

On July 7, 2021, DOE published a notice of proposed rulemaking (''NOPR'') pertaining to unitary DOASes. 86 FR 36018 (''July 2021 NOPR''). In the July 2021 NOPR, DOE proposed to establish a definition for unitary DOAS (referred to as ''DX–DOAS'' in the July 2021 NOPR) as a category of commercial package air conditioning and heating equipment and adopt a new test procedure for DX–DOASes (referred to as ''dehumidifying direct-expansion dedicated outdoor air system'' (''DDX–DOASes'') in the July 2021 NOPR) that incorporates by reference the most up to date version of the industry consensus test standard referenced in ASHRAE 90.1–2016 and 90.1–2019 (*i.e.,* AHRI 920–2020).

On December 23, 2021, DOE published a supplemental notice of proposed rulemaking (''SNOPR'') pertaining to unitary DOASes. 86 FR 72874 (December 2021 SNOPR). In the December 2021 SNOPR, DOE presented an updated proposal in response to comments received on the July 2021 NOPR. These updates included the proposal to use the terms unitary DOAS and DX–DOAS instead of the terms ''DX–DOAS'' and ''DDX–DOAS'', respectively, which were used in the July 2021 NOPR[6] (discussed further in section III.A.4 of this document), and several proposals related to the instructions in Appendix F of AHRI 920–2020 regarding testing with, and how to test, specific components (discussed further in section III.F of this document).

The proposed test procedure in the July 2021 NOPR, as revised by the December 2021 SNOPR, would apply to all DX–DOASes for which ASHRAE 90.1–2019 specifies standards, with the

[4] From the June 2018 ASHRAE eSociety Newsletter (Available at: *www.ashrae.org/news/esociety/what-s-new-in-doas-and-refrigerant-research*) (Last accessed May 24, 2021).

[5] Sensible capacity is associated with a change in dry-bulb temperature, expressed in Btu/h. Latent capacity is associated with a change in humidity ratio, expressed in Btu/h.

[6] Throughout the remainder of this final rule, DOE uses the terms unitary DOAS and DX–DOAS when referring to the text and proposals in the July 2021 NOPR instead of the ''DX–DOAS'' and ''DDX–DOAS'' terms that are present in the July 2021 NOPR to avoid confusion between notices, unless otherwise specifically stated. DOE also uses the terms unitary DOAS and DX–DOAS when referring to stakeholder comments received on behalf of the July 2021 NOPR, even if the comments used the terminology proposed in the July 2021 NOPR.

exception of ground-water-source equipment, as discussed in section III.A.1 of the July 2021 NOPR. 86 FR 36018, 36023. More specifically, DOE proposed to update 10 CFR 431.96, ''Uniform test method for the measurement of energy efficiency of commercial air conditioners and heat pumps,'' to adopt a new test procedure for DX–DOASes as follows: (1) incorporate by reference AHRI 920–2020, the most recent version of the test procedure recognized by ASHRAE 90.1 for DX–DOASes, and the relevant industry standards referenced therein; (2) establish the scope of coverage for the test procedure; (3) add definitions for unitary DOAS and DX–DOAS, as well as additional terminology required by the test procedure; (4) adopt the integrated seasonal moisture removal efficiency, as measured according to the most recent applicable industry standard (''ISMRE2''), and integrated seasonal coefficient of performance (''ISCOP2''), as measured according to the most recent applicable industry standard, as energy efficiency descriptors for dehumidification and heating mode, respectively; (5) provide instructions for testing DX–DOASes with certain specific components; and (6) establish representation requirements. DOE also proposed to add a new appendix B to subpart F of part 431, titled ''Uniform test method for measuring the energy consumption of direct expansion-dedicated outdoor air systems,'' (''appendix B'') that would include these new test procedure requirements. In conjunction, DOE proposed to amend Table 1 in 10 CFR 431.96 to identify the proposed appendix B as the applicable test procedure for testing DX–DOASes. DOE tentatively determined that the proposed test procedure would not be unduly burdensome to conduct.

DOE received a number of comments from interested parties in response to the July 2021 NOPR and December 2021 SNOPR. Table I–1 and Table I–2 list the commenters, along with each commenter's abbreviated name used throughout this final rule.

TABLE I–1—INTERESTED PARTIES PROVIDING WRITTEN COMMENTS ON THE JULY 2021 NOPR

Name	Abbreviation	Type
Air-Conditioning, Heating, and Refrigeration Institute	AHRI	IR
Appliance Standards Awareness Project, American Council for an Energy-Efficient Economy	Joint Advocates	EA
Pacific Gas and Electric Company, San Diego Gas and Electric, and Southern California Edison; collectively, the California Investor-Owned Utilities.	CA IOUs	U
Carrier Corporation	Carrier	M
Emerson Commercial and Residential Solutions	Emerson	M
Madison Indoor Air Quality	MIAQ	M
Northwest Energy Efficiency Alliance	NEEA	EA
Trane Technologies	Trane	M
Keith Rice	Rice	I

EA: Efficiency/Environmental Advocate; IR: Industry Representative; M: Manufacturer; U: Utility; I: Individual.

TABLE I–2—INTERESTED PARTIES PROVIDING WRITTEN COMMENTS ON THE DECEMBER 2021 SNOPR

Name	Abbreviation	Type
Air-Conditioning, Heating, and Refrigeration Institute	AHRI	IR
Appliance Standards Awareness Project, New York State Energy Research and Development Authority	ASAP & NYSERDA	EA
Pacific Gas and Electric Company, San Diego Gas and Electric, and Southern California Edison; collectively, the California Investor-Owned Utilities.	CA IOUs	U
Carrier Corporation	Carrier	M
Emerson Commercial and Residential Solutions	Emerson	M
Madison Indoor Air Quality	MIAQ	M
Northwest Energy Efficiency Alliance	NEEA	EA

This final rule addresses the relevant comments received in response to the July 2021 NOPR, except for those already addressed in the December 2021 SNOPR. This final rule also addresses the relevant comments received in response to the December 2021 SNOPR. A parenthetical reference at the end of a comment quotation or paraphrase provides the location of the item in the public record.[7]

[7] The parenthetical reference provides a reference for information located in the docket of DOE's rulemaking to develop test procedures for DX–DOASes. (Docket No. EERE–2017–BT–TP–0018, which is maintained at *www.regulations.gov*). The references are arranged as follows: (commenter name, comment docket ID number, page of that document).

II. Synopsis of the Final Rule

In this final rule, DOE is establishing a definition for unitary DOAS as a category of commercial package air conditioning and heating equipment and adopting a new test procedure for a subset of unitary DOASes (*i.e.,* DX–DOASes) consistent with the latest version of the industry consensus test standard specified in ASHRAE 90.1–2019. This test procedure, when effective, applies to all DX–DOASes for which ASHRAE 90.1–2019 specifies standards, with the exception of ground-water-source DX–DOASes, as discussed in section III.A.1 of this final rule. More specifically, DOE is updating 10 CFR 431.96, ''Uniform test method for the measurement of energy efficiency of commercial air conditioners and heat pumps,'' to adopt a new test procedure for DX–DOASes as follows: (1) incorporate by reference AHRI 920–2020, the most recent version of the test procedure recognized by ASHRAE 90.1 for DX–DOASes, and the relevant industry standards referenced therein; (2) establish the scope of coverage for the DX–DOAS test procedure; (3) add definitions for unitary DOASes and DX–DOASes, as well as additional terminology required by the test procedure; (4) adopt ISMRE2 and ISCOP2 as measured according to the most recent applicable industry standard, as energy efficiency descriptors for dehumidification and heating mode, respectively; (5) provide instructions for testing DX–DOASes

with certain specific components; and (6) establish representation requirements. DOE is also adding a new appendix B to subpart F of part 431, titled ''Uniform test method for measuring the energy consumption of dehumidifying direct expansion-dedicated outdoor air systems,'' (''appendix B'') that includes the new test procedure requirements for DX–DOASes. In conjunction, DOE is amending Table 1 in 10 CFR 431.96 to specify the newly added appendix B as the applicable test procedure for testing DX–DOASes. DOE has determined that the adopted test procedure will not be unduly burdensome to conduct. DOE's actions are summarized in Table II.1 and addressed in detail in section III of this document.

TABLE II.1—SUMMARY OF TEST PROCEDURE ACTIONS FOR DX–DOASES

Adopted provisions	Attribution
Incorporates by reference AHRI 920–2020 and certain relevant industry test standards referenced by that standard. AHRI 920–2020 includes: —test methods for DX–DOAS with and without ventilation energy recovery systems (''VERS''); —test operating conditions, including Standard Rating Conditions, simulated ventilation air conditions for optional test methods for DX–DOASes with VERS, supply air target conditions, supply and return airflow rates, and external static pressure; —testing instrumentation and apparatus instructions; —test operating and condition tolerances.	Adopt industry test procedure.
Defines ''unitary DOASes'' as covered equipment that meet the EPCA definition for small, large, or very-large commercial package air conditioning and heating equipment.	Establish equipment coverage.
Defines the scope of coverage of the test procedure, including defining DX–DOASes to distinguish them from other kinds of equipment and a capacity limit based on moisture removal capacity (''MRC'').	Establish scope of test procedure.
Adopts ISMRE2 and ISCOP2 as the seasonal efficiency descriptors for dehumidification and heating mode, respectively, as specified in AHRI 920–2020.	Adopt industry test procedure.
Provides minor corrections and additional instruction consistent with AHRI 920–2020 by: ..... —specifying the external head pressure requirements for DX–DOASes with integral water pumps; —specifying general control setting requirements; —providing a missing definition for a ''non-standard low-static motor,'' necessary for the interpretation of the airflow setting instructions.	Clarify instructions in the industry test procedure.
Provides instructions for testing DX–DOASes with certain specific components. This includes: ..... —a list of specific components that must be present for testing, specified in 10 CFR 429.43; —provisions for testing units with certain specific components, specified in appendix B.	Establish representation requirements.
Specifies representation requirements, including a basic model definition, sampling plan requirements, and use of alternative energy-efficiency determination methods.	Provide for representations of energy efficiency consistent with other commercial air conditioner/heat pump equipment.

The effective date for the test procedures adopted in this final rule is 30 days after publication of this document in the **Federal Register**. Representations of energy use or energy efficiency must be based on testing in accordance with the test procedures beginning 360 days after the publication of this final rule.

III. Discussion

The following sections discuss DOE's determination to establish unitary DOASes as a category of small, large and extra-large commercial package air conditioning and heating equipment, and to establish a new test procedure for DX–DOASes, a subset of unitary DOASes. This includes summarizing and addressing the relevant comments received in response to specific issues DOE raised in the July 2021 NOPR and December 2021 SNOPR that otherwise have not been addressed.

A. Scope of Applicability

1. Equipment Coverage

As discussed, DOE has determined that unitary DOASes are a category of small, large, and very large commercial package air conditioning and heating equipment and, are therefore, covered equipment under EPCA. (42 U.S.C. 6311(1)(B)–(D)) In the July 2021 NOPR, DOE proposed definitions for unitary DOASes. 86 FR 36018, 36023. DOE proposed to define unitary DOASes as a category of small, large, or very large commercial package air conditioning and heating equipment which is capable of providing ventilation and conditioning of 100-percent outdoor air or marketed in materials (including but not limited to, specification sheets, insert sheets, and online materials) as having such capability. *Id.* This proposed definition is based, in part, on the definition in Section 3.6 of AHRI 920–2020. This proposed definition included all air-cooled, air-source heat pump, and water-cooled equipment, excluding ground-water-source unitary-DOASes.[8] *Id.* DOE notes that the proposed definition included the conjunction ''or'' between the two parts of the definition, *i.e.,* capability to provide ventilation and conditioning of 100-percent outdoor air and marketing highlighting that capability.

The CA IOUs commented that there is ambiguity regarding which standards would apply to equipment that condition 100-percent outdoor air but do not dehumidify to the levels specified, such as makeup air units. The CA IOUs commented that AHRI 920–2020 references, but does not define, ''sensible-only 100-percent outdoor air units.'' The CA IOUs further stated that in response to an informal request for clarification, the Mechanical Subcommittee of the ASHRAE Standing Standards Project Committee 90.1 provided that, based on the industry definition that excludes units with recirculation capability from the industry definition of DX–DOAS, a unit would be subject to either the commercial unitary air conditioner and commercial unitary heat pump (''CUAC'' and ''CUHP'', referred collectively in this notice as ''CUAC/HPs'') or the DX–DOAS efficiency specifications in ASHRAE Standard 90.1, but not both. The CA IOUs also stated that the Mechanical

[8] For water-source heat pump equipment, ASHRAE 90.1 includes three configurations: (1) ground-source, closed loop; (2) groundwater-source; and (3) water-source. However, the EPCA definition for ''commercial package air conditioning and heating equipment'' specifically excludes ground-water-source equipment. (42 U.S.C. 6311(8)(A))

Subcommittee of the ASHRAE Standing Standards Project Committee 90.1 provided that if the application of the unit was for only 100-percent outside air, the DX–DOAS tables were to be used. The CA IOUs asserted that it was understood that the distinction between CUAC/HPs and DX–DOASes would not be evident when the definition for DX–DOAS is updated to include recirculation capability per AHRI 920–2020. The CA IOUs stated that they have requested that AHRI include clear language to distinguish the covered equipment from CUAC/HPs when an addendum to ASHRAE 90.1 is proposed. (CA IOUs, No. 25, pp. 3–4) The CA IOUs requested that DOE provide clarity on the differentiation between CUAC/HPs and DX–DOASes by requiring that equipment that is designed and marketed to operate as either a DX–DOAS or a CUAC/HP meet the standards for both equipment categories, and require that sensible-only unitary DOASes meet the CUAC/HP standards, or alternatively clarify if sensible-only unitary DOASes are unregulated by DOE. (CA IOUs, No. 25, p. 4) For the purpose of this notice, DOE is considering a sensible-only unitary DOAS to be a unitary DOAS that that is not a DX–DOAS.[9]

In response to the July 2021 NOPR, Carrier supported the use of industry standards by DOE and agreed with DOE's proposed definitions for unitary DOAS and DX–DOAS. (Carrier, No. 20, p. 2) In response to the December 2021 SNOPR, Carrier also supported DOE's proposed definitions of DX–DOAS, however, Carrier noted that DOE's proposed definition of unitary DOASes creates a potential overlap between CUAC/HPs and DOASes, and that this may especially be true for CUAC/HPs with economizers. (Carrier, No. 30, p. 2) Carrier stated that many CUAC/HPs with economizers have the ability to close a return air damper and deliver 100-percent outdoor air to the space, fitting the definition of a unitary DOAS. *Id* Similarly, in response to the December 2021 SNOPR, NEEA asserted that the unitary DOAS definition does not sufficiently separate unitary DOASes from other covered equipment, most notably including CUAC/HPs. (NEEA, No. 35, pp. 2–3) NEEA provided two model lines [10] that are listed in DOE's CCMS database for CUAC/HPs, but that advertise their capability or option of providing ventilation and conditioning of up to 100-percent outdoor air. NEEA recommended DOE clarify the current coverage of 100-percent outdoor air equipment in the CFR, and how this is modified by the addition of the unitary DOAS definition. NEEA also recommended DOE clarify if it intends to establish new test procedures and standards for unitary DOASes (DOE assumes NEEA in this instance means unitary DOAS that are not DX–DOAS), and if so, how it would align with DOE's approach for DX–DOASes and CUAC/HPs. (NEEA, No. 35, p. 3)

In response to the December 2021 SNOPR, NEEA also asserted that manufacturers do not always provide enough information in publicly available product materials to differentiate whether a model would meet the DX–DOAS or unitary DOAS definition. (NEEA, No. 35, pp. 3–4) Specifically, they noted several models,[11] separate from those previously recognized by NEEA, which are listed as capable of dehumidifying up to 100-percent outdoor air, but for which information was not readily available (*i.e.,* published MRCs or a description of ''high dehumidification ability'') to differentiate them as DX–DOASes or unitary DOASes. NEEA noted that because DOE is only establishing standards for DX–DOASes and not other unitary DOASes, these definitions could incentivize manufacturers to create products with less dehumidification flexibility to avoid testing and regulatory burden. NEEA requests that DOE clarify how CUAC/HP, unitary DOAS, and DX–DOAS are related.

AHRI and MIAQ asserted that operating conditions as opposed to physical characteristics of a unit generally distinguish between categories of unitary DOASes. (MIAQ, No. 19, p. 2; AHRI, No. 22, p. 5) AHRI also stated that the purpose of typical commercial package air conditioning and heating equipment is to supply air at temperature for comfort cooling of people, whereas a DOAS is designed to provide dehumidified, conditioned air to the building. AHRI further provided that unitary DOAS and other categories of commercial package air conditioning and heating equipment may be equipped with variable speed, indoor fans with many motors and design speed options so it may be possible to apply them to more than one application or for a customer to misapply them. AHRI recommended that the DOE regulations focus on how the units are represented in the market. (AHRI, No. 22, p. 5)

As noted, DOE proposed to define unitary DOAS as a category of small, large, or very large commercial package air conditioning and heating equipment which is capable of providing ventilation and conditioning of 100-percent outdoor air or marketed in materials (including but not limited to, specification sheets, insert sheets, and online materials) as having such capability. 86 FR 72874, 72888. DOE also requested information as to whether there are any additional characteristics not yet considered that could help to distinguish unitary DOASes from other commercial package air conditioning and heating equipment. 86 FR 36018, 36023. However, DOE did not receive any responses to this particular request for comment.

In general, if a unit meets the definition of more than one category of covered equipment, that unit must comply with the requirements applicable for each class of covered equipment.[12] Certain commercial package air conditioning and heating equipment may be capable of providing ventilation and conditioning of 100-percent outdoor air, but are not marketed for such an application. If the DX–DOAS test procedure was applied to such commercial package air conditioning and heating equipment, the results would not reflect the energy efficiency of such equipment during a representative average use cycle because the unit would be tested to conditions not encountered in operation in the field.

DOE expects that many commercial package air conditioning and heating systems are capable of providing ventilation and conditioning of 100-percent outdoor air, for example, CUACs/HPs may be capable of doing this by setting airflow lower than would be used for typical CUAC/CUHP applications, but not all of those same models would be marketed as having such capability. As indicated by the comments from AHRI and MIAQ in their response to the July 2021 NOPR, operating conditions as opposed to physical characteristics of a unit generally distinguish between categories of unitary DOASes. Therefore, marketing materials are a strong indicator of what operating conditions

[9] Sensible-only unitary DOASes are discussed further in section III.A.2 of this document.

[10] NEEA indicated the Daikin Rebel and AAON RQ/RN model lines. (NEEA, No. 35, p. 2)

[11] NEEA indicated the following units: Carrier 62X DOAS, Greenheck RV/RVE ERCH and ERT DOAS, Modine DOAS, and Addison PR Series. (NEEA, No. 35, pp. 3–4)

[12] See *e.g.,* in a final rule for consumer refrigeration products DOE stated that for a product that effectively meets the definitions of two different covered products (*e.g.,* a refrigerator and a freezer), DOE requires such a product be tested and certified as both a refrigerator and freezer. 79 FR 22319, 22343.

the unit is designed for, and what installations are suited for such a unit. As noted previously, the proposed definition would have classified a model as a unitary DOAS *either* if it had the capability to provide ventilation and conditioning of 100-percent outdoor air *or* was marketed as having that capability. After consideration of stakeholder comments, DOE recognizes that this definition would classify most CUAC/HP's as unitary DOASes, even if they are not marketed for 100-percent outdoor air applications. In order to better distinguish these equipment categories, DOE is in this final rule revising the definition for unitary DOAS to mean a category of small, large, or very large commercial package air-conditioning and heating equipment that is capable of providing ventilation and conditioning of 100-percent outdoor air *and* is marketed in materials (including but not limited to, specification sheets, insert sheets, and online materials) as having such capability. Consistent with the comment from AHRI, this definition includes consideration of how a unit is expected to be operated in the field in the determination of whether it is a unitary DOAS.

In order to clarify the equipment coverage of unitary DOASes with respect to other commercial package air conditioning and heating equipment, DOE notes that equipment that is marketed and/or distributed in commerce for both CUAC/CUHP applications and unitary DOAS applications must comply with the requirements applicable to CUAC/HPs *and* they must also comply with the requirements applicable for DX–DOASes, provided that they also meet the DX–DOAS definition as discussed in section III.A.2 of this document. If equipment that meets the DX–DOAS definition is not marketed and distributed in commerce for CUAC/CUHP applications, they would not have to comply with the requirements applicable to CUAC/HPs. DOE notes that to determine whether a unit is distributed in commerce for a certain application, DOE reviews manufacturer literature (*e.g.,* brochures, product data, installation manuals, engineering specifications) sales data, and available material.

2. Scope of Test Procedure

DOE further proposed to define for the purpose of the scope of the proposed test procedure a subset of unitary DOASes that are designed to provide a greater amount of dehumidification, *i.e.,* DX–DOASes. In the July 2021 NOPR, DOE proposed to define DX–DOAS as a unitary dedicated outdoor air system that is capable of dehumidifying air to a 55 °F dew point—when operating under Standard Rating Condition A as specified in Table 4 or Table 5 of AHRI 920–2020 with a barometric pressure of 29.92 in Hg—for any part of the range of airflow rates advertised in manufacturer materials, and has a moisture removal capacity of less than 324 pounds per hour (''lb/h''). 86 FR 36018, 36023.

In the July 2021 NOPR, DOE noted that not all unitary DOASes are designed to dehumidify outdoor air at the most humid expected summer conditions to a level consistent with comfortable indoor conditions, such as a dew point temperature less than 55 °F (*e.g.,* sensible-only unitary DOASes do not have such a design). 86 FR 36018, 36023.

AHRI,[13] MIAQ, and the CA IOUs expressed general concern about the ambiguity regarding the coverage of sensible-only unitary DOAS (AHRI, No. 22, p. 5; MIAQ, No. 19, p. 2; CA IOUs, No. 25, pp. 3–4). MIAQ and AHRI stated that operating conditions, rather than features, differentiate DX–DOAS units from sensible-only unitary DOAS units. (MIAQ, No. 19, p. 2; AHRI, No. 22, p. 5) MIAQ and Carrier commented that DX–DOASes may include a reheat coil (to meet the condition of AHRI 920), whereas sensible-only unitary DX–DOASes will not, and that that sensible-only unitary DX–DOASes are typically designed to cool outdoor air from about 95 °F dry bulb to 75 °F dry bulb at a maximum capacity and design airflow of approximately 550 cfm per ton of cooling capacity. *Id*

As previously discussed, in this final rule DOE is defining DX–DOAS as a category of unitary DOAS that is capable of dehumidifying air to a 55 °F dew point—when operating under Standard Rating Condition A as specified in Table 4 or Table 5 of AHRI 920–2020 with a barometric pressure of 29.92 in Hg—for any part of the range of airflow rates advertised in manufacturer materials, and has a moisture removal capacity of less than 324 lb/h. This is a specific distinction from equipment that would not be able to provide this level of dehumidification for any part of the range of advertised airflow rates, and it is based on operating conditions, aligning with the comments of MIAQ and AHRI. Hence, DOE will maintain this definition in establishing the test procedures for DX–DOASes. DOE notes that any unitary DOAS model that can meet this requirement fits the definition of DX–DOAS, whether or not the model is advertised in manufacturer materials to have the capability of a DX–DOAS, as defined, and will be subject to the DX–DOAS test procedure requirements. In contrast, unitary DOASes that don't meet the definition of a DX–DOAS will not be subject to the DX–DOAS test procedure requirements, but, depending on whether such models have characteristics that also align with other covered equipment (*e.g.,* CUAC/HPs), they may be subject to regulations for those other equipment categories, as discussed in section III.A.1 of this document.

a. Low Dewpoint DX–DOASes

In response to the December 2021 SNOPR, AHRI and MIAQ asserted that DX–DOASes generally fall into three ranges of performance requirements, one which requires dew points around 55 °F (as noted in the comments, the category currently described in AHRI 920–2020), a second which requires dew points of less than 50 °F,[14] and lastly, a third which requires dew points less than 30 °F.[15] (AHRI, No. 34, p. 3; MIAQ, No. 29, p. 3)

AHRI's presentation of the comments regarding the three dewpoint ranges was not fully clear in regards to the equipment that corresponds to the specific ranges. However, it is DOE's understanding that AHRI's comment indicates that the second dewpoint range (less than 50 °F) is served by models having a combination of direct expansion (''DX'') and a low temperature desiccant wheel regenerated with waste heat from the condenser, and that these units will either run lower evaporator temperatures or have desiccant wheels with regeneration fans and higher pressure drop. They also stated that their integrated seasonal moisture removal efficiency (ISMRE) will be lower than the comfort cooling counterparts and their supply air temperature will generally be lower, in the range of 65 °F. *Id.*

Regarding the third range of supply air dew point (less than 30 °F), AHRI and MIAQ stated that that equipment serving such applications are currently being served with a DOAS unit using DX, energy recovery wheels, and low

[13] In response to the July 2021 NOPR, Trane stated that they are in support of the comments that have been submitted by AHRI. (Trane, No. 23, p. 2)

[14] AHRI stated that applications for this second dew point range include chilled beam applications, hospital operating rooms, water treatment plants, pumping stations, packaging facilities, pharmaceutical plants, cold aisles in supermarkets, and food processing plants.

[15] AHRI stated that the application for this third dew point range is ice arenas.

temperature desiccant wheels, and that these units, in addition to being distinguishable from other DOAS models in providing air below a 30 °F dew point, also supply the air at a temperature around 55 °F. *Id.* AHRI and MIAQ also noted that these models often will incorporate a supplemental heater to achieve the desired supply air conditions, and that the application involves return air conditions at 55 °F dry bulb temperature and 35 °F to 40 °F dew point.

AHRI and MIAQ asserted that testing models of the second and third dew point range at the higher dew point specified in AHRI 920–2020 (*i.e.,* 55 °F) is not representative of how these models operate in the field, and that DOE should establish a separate product category for both of these equipment variants, or alternatively, that they should be excluded from the scope of coverage by establishing a floor on the application temperature. (AHRI, No. 34, p. 4; MIAQ, No. 29, p. 3)

DOE's review of the DX–DOAS market has identified a small number of model lines that operate in the third dew point range (less than 30 °F supply air dew point temperature) cited by AHRI and MIAQ. DOE's review of this equipment confirms that it is used for ice arena applications, and that it includes desiccant wheels. (EERE–2017–BT–TP–0018–0036) It is DOE's understanding that this equipment achieves regeneration of its desiccant wheels using introduction of external heat, in some cases electric heat, and in other cases using gas or steam. *Id.* DOE notes that AHRI 920–2020 does not include provision for measurement of external heat addition, particularly if the heat is provided by gas or steam. Therefore, DOE has determined that the equipment serving this third range of supply air dew point cannot be tested appropriately according to AHRI 920–2020, and that testing such units according to AHRI 920–2020 would not ensure test repeatability because of a lack of provisions specifying how to incorporate the external heating of the regeneration air into the test procedure. Hence, DOE concludes that the equipment serving this third range of supply air dew point was not anticipated to be included in the scope of DX–DOAS definition.

However, the equipment in the second supply air dew point range (less than 50 °F but not less than 30 °F) has been described by AHRI and MIAQ as having a combination of DX and a low temperature desiccant wheel regenerated with waste heat from the condenser. DOE notes that AHRI 920–2020 has provisions for testing equipment which uses desiccant wheels that have a regeneration air flow (*See, e.g.,* Figure 1 of AHRI 920–2020, ''DX–DOAS Units Airflow Schematic'', which shows a desiccant wheel and a regeneration airflow path). Hence, DOE concludes that such equipment was intended to be included as part of the scope of DX–DOAS, and would not consider such units to be excluded from the DX–DOAS definition adopted in this final rule.

b. Chilled Water Coil Exclusion

In response to the July 2021 NOPR, DOE received comment from the CA IOUs supporting the exclusion of chilled-water DX–DOASes from the scope of the test procedure, asserting that unitary equipment that uses chilled water as the heat rejection medium does not meet the definition of ''small, large, and very large commercial package air conditioning and heating equipment'' under EPCA. (CA IOUs, No. 25, p. 2)

DOE disagrees with the CA IOUs that DOE proposed to exclude chilled-water DX–DOASes from the scope of the test procedure. In the July 2021 NOPR, DOE noted that although units that use chilled water in the conditioning coil are excluded from the scope of the proposed test procedure, DOE did not propose to exclude DX–DOASes that use chilled-water as a heat rejection source from the scope of the test procedure. 86 FR 36035, 36035–36036. More specifically, in the July 2021 NOPR DOE noted that AHRI 920–2020 includes operating conditions representative of supplying a water-cooled condenser with chilled water, however Section 2 of ANSI/ASHRAE 198–2013 specifically excludes equipment with water coils that are supplied by a chiller located outside of the unit. 86 FR 36018, 36035. DOE tentatively concluded based on stakeholder comment from AHRI and Carrier, that the ANSI/ASHRAE 198–2013 exclusion specifically applies to conditioning coils, rather than condensing coils, because units with chilled water conditioning coils are not DX units (*i.e.,* units that use expansion devices for cooling). 86 FR 36018, 36036. DOE has not received information that would contradict its interpretation discussed in the July 2021 NOPR, and therefore has determined that DX–DOASes that used chilled water for heat rejection (*i.e.,* in condensing coils) are within the scope of DX–DOAS, and that these units are subject to the DX–DOAS test procedure using the cooling tower water conditions specified in Table 4 of AHRI 920–2020. Similarly, as noted in that same discussion in the July 2021 NOPR, DOE has also determined that units that use chilled water in conditioning coils are excluded from the scope of the DX–DOAS test procedure.

3. Capacity Limit

As discussed in the July 2021 NOPR, the upper capacity limit of commercial package air conditioning and heating equipment subject to the DOE test procedures is 760,000 Btu per hour, based on the definition of ''very large commercial package air conditioning and heating equipment.'' 86 FR 36018, 36023. Also as discussed in the July 2021 NOPR, AHRI 920–2020 does not provide a method for determining capacity in terms of Btu per hour, but instead, it specifies a determination of capacity in terms of moisture removal capacity (''MRC''). 86 FR 36018, 36024.

In the July 2021 NOPR, DOE proposed to translate Btu per hour to MRC. *Id.* To translate Btu per hour to MRC, DOE calculated the maximum airflow that could be supplied at a 55 °F dewpoint for Standard Rating Condition A as specified in Table 4 and Table 5 of AHRI 920–2020 by cooling and dehumidifying it with an evaporator with a refrigeration capacity of 760,000 Btu per hour. *Id.* DOE calculated this based on air entering the evaporator at Standard Rating Condition A (95 °F dry-bulb temperature and 78 °F wet-bulb temperature) and air exiting the evaporator at 55 °F dew point and 95-percent relative humidity at a standard barometric pressure of 29.92 in Hg. *Id.* DOE then calculated the MRC that corresponds to those conditions. *Id.* Based on these calculations, DOE proposed to limit the scope of the test procedure for DX–DOASes to units with an MRC less than 324 lb/h when testing to Standard Rating Condition A as specified in Table 4 or Table 5 of AHRI 920–2020, and asked for comment on this proposal. *Id.*

In response to the July 2021 NOPR, AHRI and MIAQ agreed with the proposed MRC limit of 324 lb/h. (AHRI, No. 22, p. 6; MIAQ, No. 19, p. 2) Carrier raised a concern that there may not be third party laboratory facilities available capable of testing DX–DOASes with MRCs as high as 324 lb/h, and suggested that DOE consult AHRI to understand this issue. (Carrier, No. 20, p. 2) In response to the December 2021 SNOPR, AHRI and MIAQ added to their response on this issue that the upper capacity limit of the AHRI certification program is 230 lb/h, and that there may be no existing facilities that can test to DOE's proposed maximum MRC limit. They recommended DOE review lab capabilities before finalizing the upper limit for moisture removal and noted

that the third-party lab AHRI has contracted to conduct certification program testing is building a dedicated DOAS test chamber, however it is not yet complete. *Id.*

As discussed, DOE's proposal to limit the coverage of DX–DOASes to 324 lb/h in the DX–DOAS definition is a conversion from the maximum cooling capacity limit of 760,000 Btu per hour established in EPCA. (42 U.S.C. 6311(8)(D))

DOE notes that Carrier and AHRI did not clearly state whether they recommended that the scope of equipment coverage and/or the test procedure be limited to the capacity range that can currently be tested in third party laboratories. Further, the comments are not definitive regarding the current ability of third-party laboratories to test DX–DOASes with an MRC of up to 324 lb/h, or regarding their potential future capability, in case third-party laboratories upgrade their facilities to accommodate such testing. Additionally, DOE notes that manufacturers do not need to use third-party laboratories to determine representations. Manufacturers may be able to test such models in their own laboratories, or they may also use AEDMs for the purpose of determining performance representations. AEDM validation classes are not restricted by capacity range, and none of the comments suggested that such restriction should be considered. Thus, the comments do not point to any inability of manufacturers to certify DX–DOASes with high MRCs.

For the reasons discussed, DOE is adopting as proposed the capacity limit of 324 lb/h in the definition of DX–DOASes established in this final rule. AHRI recommended two additions 0to the definition for a basic model of DDX–DOAS, such that the definition would read as, ''A basic model for a DDX–DOAS means all units manufactured by one manufacturer within a single equipment class; with the same or comparably performing compressor(s), heat exchangers, ventilation energy recovery system(s) (if present), and air moving system(s), and with a common rated ''nominal'' moisture removal capacity at condition A of AHRI 920.'' AHRI also recommended that the term ''nominal'' be defined as ''products with the same advertised MRC'' so that products are grouped correctly for regulatory purposes.

4. Terminology for Covered Equipment

As previously discussed, in the December 2021 SNOPR, DOE addressed all comments received in response to the July 2021 NOPR related to the terminology used to describe unitary DOASes and DX–DOASes and proposed to modify the terminology proposed initially in the July 2021 NOPR and to instead use the terms unitary DOAS and DX–DOAS. 86 FR 72874, 72878–72879. DOE requested comment on its proposal to use the terms unitary DOAS and DX–DOAS. *Id.*

AHRI and MIAQ supported the definitions and acronym proposed for DX–DOASes, however while they did not object to the term ''unitary DOAS'' as an umbrella term, they noted that it was vague, and encouraged DOE to adopt the term non-dehumidifying DX–DOAS (''ND–DX–DOAS'') for direct expansion sensible-only units [16] that are capable of providing 100-percent outdoor air as a subset of unitary DOAS. (AHRI, No. 34, p. 4; MIAQ, No. 29, p. 3).

DOE notes that the ND–DX–DOAS units described by commenters would fit the description of a unitary DOAS that is not a DX–DOAS. In other words, any unitary DOAS that does not meet the adopted definition of DX–DOAS is a non-dehumidifying DX–DOAS, which are not included in Standard 90.1, AHRI 920–2020, and are therefore not the subject of this test procedure. Accordingly, DOE has determined that it is not necessary to adopt the ND–DX–DOAS terminology at this time as it would be redundant. Therefore, DOE is adopting the terminology proposed in the December 2021 SNOPR (*i.e.,* DOE is adopting the terms ''unitary DOAS'' and ''DX–DOAS'').

B. Crosswalk

As first established in ASHRAE 90.1–2016, ASHRAE 90.1–2019 specifies separate equipment classes for DX–DOASes and sets minimum efficiency levels using the ISMRE metric for all DX–DOAS classes and also the ISCOP metric for air-source heat pump and water-source heat pump DX–DOAS classes. ASHRAE 90.1–2019 specifies that both metrics are to be measured in accordance with ANSI/AHRI 920–2015. ANSI/AHRI 920–2015 specifies the method for testing DX–DOASes, in part, through a reference to ANSI/ASHRAE Standard 198–2013, ''Method of Test for Rating DX-Dedicated Outdoor Air Systems for Moisture Removal Capacity and Moisture Removal Efficiency'' (''ANSI/ASHRAE 198–2013'').

As noted previously, in 2020 AHRI published AHRI 920–2020, which supersedes 920–2015. AHRI 920–2020 represents the most up to date version of AHRI 920 and is the current industry consensus test standard for testing DX–DOASes. AHRI 920–2020 contains multiple revisions to ANSI/AHRI 920–2015. These revisions include, among other things, the following: (1) expanded scope of coverage of the test procedure by no longer imposing an upper limit of 97 lb/h on MRC, thereby making the test procedure applicable to all DX–DOASes subject to standards under ASHRAE 90.1; (2) revised outdoor air dry-bulb temperature conditions, external static pressure (''ESP'') conditions, humidity conditions, and weighting factors for ISMRE and ISCOP, which were redesignated as ISMRE2 and ISCOP2, respectively; (3) a revised test approach that prohibits nonrepresentative over-dehumidification and provides methods to address cycling or staging to achieve average target supply air conditions; (4) the addition of a supplementary cooling penalty when excessive reheating raises supply air dry-bulb temperature above 75 °F in dehumidification mode; (5) removal of a supplementary heat penalty for the efficiency metric ISMRE2 when the supply air dry-bulb temperature is less than 70 °F in dehumidification mode;[17] (6) revised condenser water conditions for water-cooled and water-source heat pump DX–DOASes; (7) added requirements for supply air dew point temperature; [18] (8) added requirements for outdoor coil liquid flow rate; (9) additional test unit, test facility, instrumentation, and apparatus set-up provisions; (10) revised test methods for DX–DOASes equipped with VERS; (11) requirements for relief-air-cooled DX–DOASes and DX–DOASes equipped with desiccant wheels; and (12) included requirements for secondary capacity tests.

As discussed, the energy efficiency standards specified in ASHRAE 90.1 are based on ANSI/AHRI 920–2015 and ANSI/ASHRAE 198–2013. The amendments adopted in AHRI 920–2020 result in changes to the measured efficiency metrics as compared to the results under ANSI/AHRI 920–2015.

[16] As stated in section III.A.1 of this document, for the purpose of this notice, DOE is considering a sensible-only unitary DOAS to be a unitary DOAS that that is capable of providing ventilation and conditioning of 100-percent outdoor air and is marketed in materials as having such capability but is not primarily designed to dehumidify outdoor air (*i.e.,* a unitary DOAS but not a DX–DOAS).

[17] As discussed in section III.D of this final rule, AHRI 920–2020 additionally provides a method for calculating $ISMRE2_{70}$, an optional application metric for the dehumidification efficiency with the inclusion of the supplementary heat penalty.

[18] Dew point is the temperature below which water begins to condense from the water vapor state in humid air into liquid water droplets. Dew point varies with humidity (*e.g.,* a low dew point indicates low humidity and vice versa) and is, therefore, used to specify the humidity of the supply air.

In the July 2021 NOPR, DOE requested comment and data on the development of a crosswalk from the efficiency levels in ASHRAE 90.1 based on ANSI/AHRI 920–2015 to efficiency levels based on AHRI 920–2020. DOE also requested comment on how dehumidification and heating efficiency ratings for a given DX–DOAS model are impacted when measured using AHRI 920–2020 as compared to ANSI/AHRI 920–2015. 86 FR 36018, 36027.

DOE received comment from AHRI, MIAQ, and Trane stating that a crosswalk from ISMRE to ISMRE2 and ISCOP to ISCOP2 is currently under development. (AHRI, No. 22, p. 2; MIAQ, No. 19, p. 2; Trane, No. 23, p. 2) AHRI stated that its members have been working with DOE and the CA IOUs to develop the ISCOP-to-ISCOP2 crosswalk. AHRI commented that it has collected and analyzed data under a non-disclosure agreement to develop this crosswalk, and AHRI intends to make this data available to DOE once its crosswalk analysis is complete. (AHRI, No. 18, pp. 12–13) More specifically, AHRI commented that there is a low correlation between ISMRE and ISMRE2 ratings (approximately 65 percent), and that consequently the ISMRE-to-ISMRE2 crosswalk required more complex modeling to map the relationship between the two metrics. AHRI stated that it has completed the ISMRE-to-ISMRE2 crosswalk analysis, but did not provide the results of the analysis in its comments. AHRI stated that once a consensus is achieved on this crosswalk, AHRI will submit a proposed addendum to the ASHRAE Standing Standards Project Committee 90.1 through the Mechanical Subcommittee for the inclusion of the crosswalked ISMRE2 and ISCOP2 levels in ASHRAE 90.1–2022. (AHRI, No. 22, pp. 3–4, 6)

MIAQ urged DOE to continue working with AHRI and other relevant stakeholders to develop the crosswalk and subsequently support an amendment to ASHRAE 90.1 to adopt AHRI 920–2020, and then complete the rulemaking to adopt AHRI 920–2020 as the Federal test procedure. (MIAQ, No. 19, p. 6)

DOE has engaged with AHRI in the crosswalk being developed by AHRI by attending meetings and sharing DOE data. DOE has also initiated a rulemaking to analyze DX–DOAS energy conservation standards and published a NOPR in the **Federal Register** on February 1, 2022, regarding these standards (February 2022 ECS NOPR). (87 FR 5560, 5575) In the February 2022 ECS NOPR, DOE developed a crosswalk analysis to determine ISMRE2 and ISCOP2 minimum efficiency levels of equivalent stringency to the ISMRE and ISCOP minimum efficiency levels currently published in ASHRAE Standard 90.1. *Id.* Details of DOE's analysis and results can be found in the February 2022 ECS NOPR and the accompanying technical support document. DOE will continue to address any differences in the measured energy efficiency under the most recent industry test procedure as compared to the industry test procedure on which the ASHRAE 90.1 levels are based in the ongoing standards rulemaking, as discussed in the February 2022 ECS NOPR.

C. Harmonization With Industry Standards

AHRI asserted that DOE lacks the authority to adopt AHRI 920–2020 at this time, stating that there is no allowance for DOE to consider a test procedure different from that cited in ASHRAE Standard 90.1 for a test procedure's initial adoption as a national standard. (AHRI, No. 22, p. 2) AHRI further asserted that in order for DOE to deviate from ANSI/AHRI 920–2015, the Department would need to propose the adoption of ANSI/AHRI 920–2015 and justify by clear and convincing evidence each amendment made to arrive at a test procedure equivalent to AHRI 920–2020, which AHRI conceded would be unnecessarily onerous. (AHRI, No. 22, pp. 2–3)

MIAQ similarly asserted that DOE does not have the authority to adopt AHRI 920–2020 as the national test procedure. (MIAQ, No. 19, p. 6) MIAQ requested that DOE wait for AHRI 920–2020 to be adopted in ASHRAE Standard 90.1 and for energy conservation standard levels in ASHRAE Standard 90.1 to be established using the new metrics before finalizing this test procedure rulemaking. (MIAQ, No. 19, p. 6) MIAQ argued that having different metrics cited in ASHRAE Standard 90.1 and in the Federal regulations would cause additional costs for compliance with disharmonized requirements. (MIAQ, No. 19, p. 6) MIAQ reiterated these concerns in response to the December 2021 SNOPR, and it additionally noted that waiting for ASHRAE to adopt standards in ASHRAE Standard 90.1 based on the AHRI 920–2020 test method would establish not only consistent energy efficiency levels and design requirements between ASHRAE Standard 90.1 and the Federal requirements, but comparable metrics as well. (MIAQ, No. 29, p. 2)

Trane argued that DOE must support the current version of AHRI 920 as referenced in ASHARE Standard 90.1 (*i.e.,* AHRI 920–2015), noting that the 2020 version of AHRI 920 has not been adopted and finalized by ASHRAE yet. (Trane, No. 23, p. 1) Trane asserted that adoption of AHRI 920–2020 prematurely would cause confusion in the marketplace, as the metrics are substantially changed from the 2015 version and a correct ''cross walk'' needs to be established to show the change from the two metrics. *Id.*

In contrast, the CA IOUs commented that there would be little value in delaying the finalization of a test procedure for DX–DOASes, because an industry test procedure has already been established with broad stakeholder engagement. (CA IOUs, No. 25, p. 2) Consequently, the CA IOUs supported DOE's proposal to incorporate AHRI 920–2020 by reference, (along with slight modifications) and encouraged DOE to expeditiously finalize the test procedure for DX–DOAS. The CA IOUs stated that DOE was triggered to review the coverage of DX–DOAS equipment as a result of ASHRAE Standard 90.1–2016 (and to adopt standards for DX–DOASes within 18 months of the inclusion of DX–DOAS standards in ASHRAE Standard 90.1–2016). (CA IOUs, No. 25, pp. 1–2) The CA IOUs also stated that AHRI 920–2020 is the industry consensus test procedure for DX–DOAS equipment, which was developed through a collaborative process with a range of stakeholders, including DOE representatives and the CA IOUs, many of whom are also engaged in the process by which ASHRAE Standard 90.1 would be updated to reference AHRI 920–2020. (CA IOUs, No. 25, p. 1)

In response, DOE disagrees with assertions by commenters that it lacks the authority to adopt AHRI 920–2020. As discussed previously, ASHRAE Standard 90.1–2016 for the first time included provisions specific to DX–DOASes. The amendment to ASHRAE Standard 90.1 to specify an industry test standard for DX–DOASes triggered DOE's obligations vis-à-vis test procedures under 42 U.S.C. 6314(a)(4)(B), as outlined previously. With respect to small, large, and very large commercial package air conditioning and heating equipment (of which DX–DOASes are a category), EPCA directs that when the generally accepted industry testing procedures or rating procedures developed or recognized by AHRI or by ASHRAE, as referenced in ASHRAE Standard 90.1, is amended, the Secretary shall amend the DOE test procedure consistent with the amended industry test procedure or rating procedure unless the Secretary determines, by clear and convincing evidence, that to do so would not meet

the requirements for test procedures to produce results representative of an average use cycle and is not unduly burdensome to conduct. (42 U.S.C. 6314(a)(4)(B)).

In this instance, the industry test procedure referenced in ASHRAE Standard 90.1, AHRI 920–2015, has been superseded in the intervening years since DOE was first triggered to review the DX–DOAS provisions of ASHRAE Standard 90.1–2016. As supported by many of the comments that DOE received, including from AHRI itself, DOE has determined, by clear and convincing evidence, that AHRI 920–2015 is not reasonably designed to produce test results which reflect energy efficiency of DX–DOASes during a representative average use cycle and that some components of AHRI 920–2015 are unnecessarily burdensome. The issues associated with the ANSI/AHRI 920–2015 test standard include (1) test outdoor air dry-bulb temperature conditions, ESPs, humidity conditions, and weighting factors for ISMRE and ISCOP are not representative of national-average DX–DOAS operating conditions and were claimed to be impossible to achieve in test laboratories; (2) the test standard includes no specification of supply air dew point for part-load dehumidification test conditions, thus making the test standard flawed as a test for comparing performance of different DX–DOAS models and incentivizing unnecessary over-dehumidification; (3) the use of a supplementary heating penalty that is not representative of many DX–DOAS installations for which internal heat gain is high, and thus reheating up to 70 °F is not required and wastes energy; (4) the excessive burden associated with the requirement to use two airflow rate measurement devices for each airflow path; (5) test methods for DX–DOAS with ventilation energy recovery systems (''VERS'') that were claimed to be impossible to conduct in test laboratories; and (6) no provisions for testing DX–DOAS models with relief-air-cooled refrigeration systems. AHRI itself commented that ANSI/AHRI 920–2015 ''suffers from fatal flaws that have been corrected in the 2020 edition.'' (AHRI, No. 22, p. 2) Were DOE not to adopt AHRI 920–2020, the fatal flaws present in ANSI/AHRI 920–2015 would arguably cause more confusion in the marketplace and burden for manufacturers than, as Carrier suggested, would be caused by DOE adopting AHRI 920–2020. Also, DOE disagrees with AHRI's assertion that DOE must justify by clear and convincing evidence each amendment made to arrive at a test procedure equivalent to AHRI 920–2020. EPCA does not require such an analysis. Rather, EPCA requires that the test procedure, as a whole, be representative of an average use cycle and not unduly burdensome to conduct. DOE has determined, by clear and convincing evidence, that AHRI 920–2015, as a whole, does not meet these criteria. And DOE has determined that AHRI 920–2020, as a whole, is representative of an average use cycle and is not unduly burdensome to conduct.

DOE recognizes that adopting AHRI 920–2020 as the Federal test procedure for DX–DOASes may create some disharmony between the Federal test procedure and the test procedure currently specified in ASHRAE Standard 90.1 for a period of time. However, such disharmony is likely to be brief given the anticipated adoption of AHRI 920–2020 in ASHRAE Standard 90.1–2022 later this year, and such a situation is preferable to the alternative in which DOE would need to reinitiate another rulemaking after this proceeding to amend the Federal test procedure from AHRI 920–2015 to AHRI 920–2020—precisely the same testing standard available for consideration at the present time. Given the passed statutory deadline for this rulemaking, such delay and waste of agency resources is unwarranted, particularly where DOE has undertaken an appropriate crosswalk to migrate to the new metrics. Additionally, DOE notes that commenters' concern regarding a crosswalk and potential market confusion from having Federal standards rely on different metrics than the efficiency levels specified in the current version of ASHRAE Standard 90.1 relate to the establishment of Federal energy conservation standards for DX–DOASes, which DOE is addressing in a separate rulemaking. Finally, DOE notes that manufacturers are not required to use the test procedure to make representations until 360 days after issuance of this final rule, and they are not required to use the test procedure to certify compliance with any energy conservation standards for DX–DOASes until the compliance date established for such standards.

Accordingly, for the foregoing reasons, DOE is incorporating by reference AHRI 920–2020, with the identified modifications, into the Federal test procedure for DX–DOASes because DOE has determined, by clear and convincing evidence, that the industry test procedure specified in ASHRAE Standard 90.1 (AHRI 920–2015) would not produce results that are representative of the energy efficiency of that covered equipment during an average use cycle and would be unduly burdensome to conduct.

D. Efficiency Metrics

As previously mentioned, AHRI 920–2020 includes a dehumidification efficiency metric (ISMRE2) and heating efficiency metric (ISCOP2) for DX–DOASes. The ISMRE2 and ISCOP2 metrics are different from the metrics adopted in ASHRAE 90.1–2016 (ISMRE and ISCOP). The ISMRE2 metric is determined by calculating a weighted average of the four moisture removal efficiency (''MRE'') values measured during each of the four tests performed at the dehumidification Standard Rating Conditions.[19] ISCOP2 is determined by taking a weighted average of the two coefficient of performance (''COP'') values measured during each of the two tests performed at the heating Standard Rating Conditions. Test conditions and weighting factors for the Standard Rating Conditions are specified in Sections 6.1, 6.12, and 6.13 of AHRI 920–2020. In the July 2021 NOPR, DOE proposed to adopt the ISMRE2 and ISCOP2 metrics as specified in AHRI 920–2020. 86 FR 36018, 36028.

NEEA recommended that DOE account for ventilation-only operation (*i.e.,* no heating or cooling demand) for all commercial package air-conditioning and heating equipment, including DX–DOASes. NEEA stated that the proposed efficiency metrics do not account for the energy consumption and losses associated with ventilation-only operation. NEEA recommended that DOE consider non-heating and non-cooling operational modes in the efficiency metric to better account for the effect of enclosure losses (*e.g.,* shell losses, casing leakage, and damper leakage) on whole-package efficiency, asserting that rooftop equipment, including DX–DOASes, may spend most of the time not actively heating or cooling the building, and that enclosure losses occur during this type of operation. (NEEA, No. 24, pp. 2–3)

NEEA further commented that, because the proposed efficiency metrics do not account for ventilation-only operation, the proposed test procedure does not fully capture the potential benefits of measures such as improved

[19] Standard Rating Conditions in AHRI 920–2020 represent full-load and part-load operating conditions for testing DX–DOASes. Standard Rating Condition A represents full-load operation in dehumidification mode, whereas Standard Rating Conditions B–D represent part-load operation in dehumidification mode. Standard Rating Condition E represents full-load operation in heat pump mode at high temperatures, and Standard Rating Condition F represents full-load operation in heat pump mode at low temperatures.

insulation, decreased casing leakage, and decreased damper leakage. NEEA stated that it is aware of DX–DOASes with low-leakage damper and 2-inch double wall foam insulation, whereas it is common to use 1-inch fiberglass batting for other rooftop equipment that is not designed for 100-percent outdoor air. NEEA stated that enclosure losses are driven by natural or forced recirculation of building air through the rooftop unit but indicated that the prevalence of recirculation for DX–DOASes is not known. NEEA recommended that DOE research this to determine whether it is necessary to include ventilation-only operation in the efficiency metrics. (NEEA, No. 24, p. 3)

Regarding non-heating and non-cooling operational modes, including ventilation-only operation, the data provided by NEEA is informative and preliminarily indicates that there may be an opportunity to more fully capture the energy efficiency of DX–DOASes when operating in a mode other than mechanical cooling and heating, such as ventilation, into the test procedure. Evaluation of whether, and to what extent, supply fan use in operating modes other than mechanical cooling and heating in DX–DOASes is addressed will require additional data collection and analysis by the Department. Absent such data and analyses, DOE continues to conclude that AHRI 920–2020 is reasonably designed to produce results reflecting the energy efficiency of DX–DOASes during a representative average use cycle because of the omission of other operating modes. As such, DOE is adopting the ISCOP2 and ISMRE2 metrics specified in AHRI 920–2020.

DOE also received a comment from Rice in response to the July 2021 NOPR regarding the efficiency metrics in AHRI 920–2020. (Rice, No. 26, p. 1) Rice indicated that the method of calculating ISMRE2 using a weighted average of MRE results from the four Standard Rating Conditions in AHRI 920–2020 may not be appropriate. Rice claimed that the calculation of the integrated metric would be correct if, instead, the weighting factors were based on the fractional moisture removal capacity at each Standard Rating Condition.[20] (Rice, No. 26, p. 1–2) Rice also asserted that the method of calculating the integrated efficiency metrics in AHRI 920 would have errors that are magnified for DX–DOASes with variable capacity control, for which the equipment's efficiency may vary widely at different part-load conditions. Rice indicated that this impact was considered for room air conditioners and portable air conditioners, and that DOE did change the proposed weighting method to account for variable-speed room air conditioners. *Id.*

Regarding the test conditions and weighting factors, DOE notes that the test conditions for each of the Standard Rating Conditions in AHRI 920–2020 were developed in part by weather data provided by DOE, and AHRI's review of a Typical Meteorological Year (''TMY'') 2,[21] which was performed with weather data from the National Renewable Energy Laboratory. Additionally, the weighting factors in AHRI 920–2020 were developed to represent the number of hours per year spent at each test condition. AHRI 920–2020 requires that a unit is tested at each of the four dehumidification Standard Rating Conditions when determining the ISMRE2 metric, and that the performance of the unit at each test point (including part-load) is incorporated into the ISMRE2 metric. While individual equipment performance at part-load may vary between different model lines, each unit is tested under the same Standard Rating Conditions that produce results of DX–DOAS efficiency during operation under representative conditions. As discussed by Rice, this approach differs from the approach used for residential room air conditioners and portable air conditioners, however DOE notes that it aligns with the approach taken for other small, large, and very large commercial package air conditioning and heating equipment (*e.g.,* the IEER metric specified in AHRI 340/360).

For the reasons discussed previously, DOE has determined that at this time, the test conditions and weighting factors in AHRI 920–2020 are appropriate for determining the representative performance of DX–DOAS units, and that the resulting ISMRE2 and ISCOP2 values are based on up-to-date weather data and operation hours. DOE recognizes that comments provided by Rice are informative and may suggest the need for DOE to investigate further the approach used to calculate DX–DOAS performance in a future rulemaking. However, without further information, DOE continues to conclude that the test conditions and weighting factors in AHRI 920–2020 produce results reflecting the energy efficiency of DX–DOASes during a representative average use cycle. Therefore, DOE is adopting the test conditions and weighting factors in AHRI 920–2020.

AHRI 920–2020 also provides additional efficiency metrics $ISMRE2_{70}$, COP_{full} and COP_{DOAS} and methods for calculating them. $ISMRE2_{70}$ is an application metric for the seasonal dehumidification efficiency with the inclusion of a supplementary heat penalty. The subscript ''70'' indicates the inclusion of energy use from any supplementary heat that is required to raise the supply air dry bulb temperature to 70 °F. COP_{DOAS} is applicable for heating mode test conditions E and F using the heat pump capacity level that most closely achieves supply air temperature in the range 70 °F to 75 °F (or a weighted average of capacity levels to achieve average supply air temperature in this range) and is calculated without a supplementary heat penalty. COP_{full} is calculated with manufacturer-specified outdoor conditions for DX–DOAS full heat pump capacity level, also without supplementary heat penalty. Additionally, AHRI 920–2020 provides optional application rating test conditions for water-cooled DX–DOASes using the ''Condenser Water Entering Temperature, Chilled Water'' conditions specified in Table 4 of AHRI 920–2020 and for water-source heat pump DX–DOASes using the ''Water-Source Heat Pump, Ground-Source Closed Loop'' conditions specified in Table 5 of AHRI 920–2020.

In the July 2021 NOPR, DOE proposed to adopt these additional efficiency metrics and test conditions to allow for optional representations made using these metrics.[22] 86 FR 36018, 36060 DOE proposed including these application representations to clarify that such representations are not contrary to EPCA requirements that representations regarding energy consumption be made on the basis of DOE test procedures (42 U.S.C. 6314(d)). DOE received no comment on this proposal in response to the July 2021 NOPR.

For the reasons discussed in the July 2021 NOPR and in the preceding paragraph, DOE is establishing these

[20] DOE understands the commenter's term ''fractional moisture removal capacity'' to refer to the ratio between the total moisture removed during times that the conditions are in the range of a given bin to the total moisture removed during the entire dehumidification (cooling) season.

[21] TMY is a widely used type of data available through the National Solar Radiation Database. TMYs contain one year of hourly data that best represents median weather conditions over a multiyear period. The datasets have been updated occasionally; thus, TMY, TMY2, and TMY3 data are available. *See nsrdb.nrel.gov/about/tmy.html* (last accessed 4/28/21).

[22] DOE included a typographical error in the July 2021 NOPR when proposing to adopt ''$ISMRE_{70}$'' to allow for optional representations made using this metric in proposed section 2.2.2(a) of Appendix B. DOE has corrected this in this final rule by adopting ''$ISMRE2_{70}$''.

metrics to allow for optional representations, as enumerated in section 2.2.3 of appendix B.

E. Test Method

1. Definitions

a. ISMRE2, ISCOP2, and VERS

In the July 2021 NOPR, DOE proposed to define ISMRE2 to mean ''a seasonal weighted average dehumidification efficiency for dedicated outdoor air systems, expressed in lbs. of moisture/kWh, as measured according to appendix B.'' 86 FR 36018, 36057. DOE proposed to define ISCOP2 to mean ''a seasonal weighted-average heating efficiency for heat pump dedicated outdoor air systems, expressed in W/W, as measured according to appendix B.'' *Id.* DOE proposed to define VERS to mean ''a system that pre-conditions outdoor ventilation air entering the equipment through direct or indirect thermal and/or moisture exchange with the exhaust air, which is defined as the building air being exhausted to the outside from the equipment.'' *Id.* DOE requested comment on the proposed definitions for ISMRE2, ISCOP2, and VERS. *Id.* at 86 FR 36029.

AHRI, Carrier, and MIAQ agreed with DOE's proposed definitions for ISMRE2, ISCOP2, and VERS. (AHRI, No. 22, p. 6; Carrier, No. 20, p. 3; MIAQ, No. 19, p. 3) Emerson recommended that DOE revise the proposed definition for VERS by removing the prefix ''pre'' from ''pre-condition,'' asserting that whether it is pre-, post-, or in a single step, the conditioning is what is important, and that being overly prescriptive in the definition could limit future technology options. (Emerson, No. 27, p. 2) Emerson reiterated this comment in response to the December 2021 SNOPR, also adding that the wording change is an important detail for desiccant systems, that the test procedure uses a ''black box'' approach to the equipment, not prescribing how the different air flows interact in the equipment. (Emerson, No. 33, pp. 1–2)

DOE notes that the requirement to pre-condition outdoor ventilation air is inherent to the function of VERS in AHRI 920–2020, and how VERS is treated in AHRI 920–2020. Contrary to Emerson's claim that the test procedure uses a ''black box'' approach, the treatment, for example, of air that leaks or is transferred from the return to the supply side of the VERS, or the ''Option 2'' method of test are very much dependent on the way the air flows through the DX–DOAS. Additionally, Section 3.28 of AHRI 920–2020 similarly defines VERS as a system that pre-conditions outdoor air. DOE is not currently aware of VERS that do not pre-condition, and notes that currently, pre-conditioning outdoor air (as opposed to post-conditioning, for example) is commonplace in DX–DOAS models of which DOE is aware. Therefore, DOE is adopting the definition of VERS as proposed and as defined in AHRI 920–2020.

b. Non-Standard Low-Static Motor

In the July 2021 NOPR, DOE noted that AHRI 920–2020 uses the term ''non-standard low-static motor'', however AHRI 920–2020 does not define the term. 86 FR 36018, 36042. DOE proposed to define a non-standard low static motor as a supply fan motor that cannot maintain ESP as high as specified in Table 7 of AHRI 920–2020 when operating at a manufacturer-specified airflow rate and that is distributed in commerce as part of an individual model within the same basic model of a DX–DOAS that is distributed in commerce with a different motor specified for testing that can maintain the required ESP. *Id.* DOE requested comment on this proposed definition. *Id.*

In response to the July 2021 NOPR, the Joint Advocates, the CA IOUs, and Carrier supported DOE's proposed definition for non-standard low-static fan motor. (Joint Advocates, No. 21, pp. 1–2; CA IOUs, No. 25, p. 3; Carrier, No. 20, p. 3) AHRI and MIAQ recommended that DOE include the definition of ''non-standard motor'' from Section D3 of appendix D to AHRI 340/360–2019, instead of introducing a new definition. (AHRI, No. 22, p. 8; MIAQ, No. 19, p. 3)

DOE understands the term ''non-standard motor'' as defined in AHRI 340/360–2019 and the term ''non-standard low-static motor'' in AHRI 920–2020 to differ. Specifically, the term ''non-standard low-static motor'' is used in Sections 6.1.5.2.3 and 6.1.5.2.4 of AHRI 920–2020 to identify a motor that cannot meet certain test requirements for performing a valid test. Specifically, Section 6.1.5.2.3 of AHRI 920–2020 provides that if a fan's maximum speed is too low to satisfy the airflow and ESP requirements within tolerance and the motor is not a non-standard low-static motor, the maximum speed is used, and the airflow measurement apparatus fan is adjusted to achieve the desired ESP. Whereas Section D3 of AHRI 340/360–2019 states that a non-standard motor is an indoor fan motor that ''is not the standard indoor fan motor'' and that is distributed in commerce as part of an individual model within the same basic model, and that the standard indoor fan motor is the motor specified by the manufacturer for testing. In sum, AHRI 340/360–2019 defines a ''non-standard motor'' to identify which motor is not specified by the manufacturer for testing, which has a different meaning than the term ''non-standard low-static motor'' used in AHRI 920–2020.

Without a definition of ''non-standard low-static motor,'' manufacturers may not apply the ''maximum speed'' provisions consistently, and the potential for variation risks results that do not reflect the equipment's representative average energy efficiency or energy use. As such, DOE has determined, that in the absence of a definition of ''non-standard low-static motor,'' the industry test procedure would not meet the statutory requirements of 42 U.S.C. 6314(a)(2)–(3), and that the definition proposed in the July 2021 NOPR is appropriate to adopt. Therefore, in section 2.2.1(a)(i) of appendix B, DOE is establishing a definition for ''non-standard low-static motor'' consistent with the definition proposed in the July 2021 NOPR.

2. General Control Setting Requirements

Requirements for adjustment of unit controls during set-up for testing of a DX–DOAS are addressed in specific Section 6 of AHRI 920–2020. Some examples include the following. Section 5.2, ''Equipment Installation,'' requires that units be installed per manufacturer's installation instructions, Section 5.4.3, ''Deactivation of VERS,'' indicates that operation of the VERS may be deactivated for Standard Rating Conditions C or D if the VERS is capable of being deactivated, and Section 5.5, ''Defrost Controls for Air-Source Heat Pump during Heating Mode,'' provides instructions for setting of defrost controls. However, DOE notes that the test standard provides no general requirements indicating whether control settings can be adjusted as the test transitions through the four Standard Rating Conditions used for testing.

In the July 2021 TP NOPR, DOE noted that manual readjustment of control settings would not generally occur in field operation of DX–DOASes as outdoor air conditions change, but that manual intervention throughout testing may be required (*e.g.,* manually setting the compressor capacity staging for tests using the ''Weighted average method,'' as described in Section 6.9.1 of AHRI 920–2020). 86 FR 36018, 36036–36037. Absent such instruction, the controls could be adjusted as the test transitions through the four Standard Rating Conditions used for testing, which as discussed, would not be representative of the operation of the unit in the field.

Therefore, DOE proposed that all control settings are to remain unchanged for all Standard Rating Conditions once system set-up has been completed, and component operation shall be controlled by the unit under test once the provisions in Section 6 of AHRI 920–2020 (Rating Requirements) are met, except as specifically allowed by the test standard or supplemental test instructions (''STI'').[23] 86 FR 36018, 36037. In the July 2021 NOPR, DOE requested comment on this proposal. *Id.*

In response to the July 2021 NOPR, AHRI, the Joint Advocates, the CA IOUs, Carrier, and MIAQ generally agreed with DOE's proposed requirements for controls settings. (AHRI, No. 22, pp. 7–8; Joint Advocates, No. 21, p. 1; CA IOUs, No. 25, pp. 4–5; Carrier, No. 20, p. 3; MIAQ, No. 19, p. 3) More specifically, the CA IOUs and Joint Advocates stated that this approach would help improve representativeness, and MIAQ agreed with DOE that manually setting the compressor capacity staging for tests using the ''Weighted average method,'' as described in Section 6.9.1 of AHRI 920–2020, is an allowed intervention to address a unit cycling operation between two compressor stages to target supply air dew point over the average of a time period. (Joint Advocates, No. 22, pp. 7–8; CA IOUs, No. 25, p. 4–5; MIAQ, No. 19, p. 3)

DOE has determined, that absent instruction for the control settings to be fixed during testing, the industry test procedure would not meet the statutory requirements of 42 U.S.C. 6314(a)(2)–(3) and is, therefore, adopting such instruction. DOE has determined that the inclusion of instructions that control settings be fixed during testing, except as specifically allowed by the test procedure or STI, would improve the representativeness of the test procedure. Therefore, DOE is adopting the supplemental instructions proposed in the July 2021 NOPR regarding general control settings in section 2.2.1(b)(i) of appendix B.

In response to the July 2021 NOPR, AHRI also recommended that certain exceptions (in addition to those specified in the STI) should be addressed where intervention may be universally required. (AHRI, No. 22, pp. 7–8) Specifically, AHRI indicated that manual intervention may be necessary for: compressor capacity staging for tests using the interpolation approach, manual override for condensing unit cyclic fan operation, and adjustment of customer controls with tolerance deviations greater than those specified in AHRI 920–2020. AHRI commented that manual override of condenser fans would be consistent with Section 6.1.1.3 of AHRI Standard 340/360–2019, ''Performance Rating of Commercial and Industrial Unitary Air-conditioning and Heat Pump Equipment'' (''AHRI 340/360–2019''), and that override controls should not be included in the total power consumption measurement. AHRI also commented that adjustment of the supply air dew point temperature dead band may be required to achieve steady state operation and should be permitted. *Id.*

DOE has determined that if any form of manual intervention is required during testing that is not addressed by AHRI 920–2020, including the intervention required to address the scenarios described by AHRI, specifications for such intervention should be included in the STI. Furthermore, DOE has concluded that a universal approach specified in the test procedure would not be appropriate for all DX–DOAS units because proper control adjustment may vary from model to model, requiring action unique to a specific model. Therefore, DOE has determined to not specify further instructions for setting control settings during testing.

3. Test Operating Conditions

In the July 2021 NOPR, DOE noted that through proposing to adopt the test procedure in AHRI 920–2020, DOE would adopt the test operating conditions specified in AHRI 920–2020 for DX–DOAS units, and that these include: (1) Standard Rating Conditions (Tables 4 and 5 of Section 6 of AHRI 920–2020, as enumerated in section 2.2.1(c) of appendix B, which references Section 6 of AHRI 920–2020 omitting Sections 6.1.2 and 6.6.1); (2) simulated ventilation air conditions for testing under Option 2 for DX–DOASes with VERS (Section 5 of AHRI 920–2020 (which includes Section 5.4.1.2 *Option 2*), as enumerated in section 2.2.1(b) of the proposed appendix B, which references Section 5 of AHRI 920–2020); (3) atmospheric pressure (Section 5 of AHRI 920–2020 (which includes Section 5.10 *Atmospheric Pressure*), as enumerated in section 2.2.1(b) of the proposed appendix B); (4) target supply air conditions (Section 6 of AHRI 920–2020 (which includes Section 6.1.3 *Supply Air Dewpoint Temperature* and Section 6.1.4 *Supply Air Dry Bulb Temperature*), as enumerated in section 2.2.1(c) of the proposed appendix B); (5) external static pressure (Section 6 of AHRI 920–2020 (which includes Section 6.1.5.6 *External Static Pressure*), as enumerated in section 2.2.1(c) of the proposed appendix B); and (6) target supply and return airflow rates (Section 6 of AHRI 920–2020 (which includes Section 6.1.5 *Supply and Return Airflow Rates*), as enumerated in section 2.2.1(c) of the proposed appendix B). 86 FR 36018, 36030–36031.

In the July 2021 NOPR, DOE further discussed the following topics related to the test operating conditions DOE proposed to adopt: (1) target supply and return airflow rates; (2) units with cycle reheat functions; (3) target supply air dry-bulb temperature; (4) target supply air dew-point temperature; and (5) units with staged capacity control. 86 FR 36018, 36031–36033. Aside from the comments addressed elsewhere in this final rule, DOE did not receive additional comments regarding these topics and the proposals therein. For the reasons discussed in the July 2021 NOPR, DOE is adopting the test operating conditions in AHRI 920–2020 that were presented in the July 2021 NOPR (*i.e.,* the conditions summarized previously in this section), as enumerated in sections 2.2.1(b) and 2.2.1(c) of appendix B.

4. Break-In Period

In the July 2021 NOPR, DOE noted that Section 5.6 of AHRI 920–2020 includes a provision that the break-in is not to exceed 20 hours, and DOE proposed to adopt this provision through reference to AHRI 920–2020. 86 FR 36018, 36030. DOE also noted that the proposed break-in provision aligns with the test procedures for other commercial package air conditioners and heat pumps. *Id.* DOE received no further comment on this topic in response to the July 2021 NOPR.

Since the publication of the July 2021 NOPR, DOE has determined that the requirements for specification of break-in may not be clear in the proposed test procedure. Although, Section 5.6 of AHRI 920–2020 states that ''the break-in conditions and duration shall be specified by the manufacturer,'' AHRI 920–2020 does not clarify where the manufacturer should specify that information. DOE notes that AHRI 340/360–2022 specifically states that the break-in should be conducted using the ''manufacturer-specified'' duration and conditions and defines ''manufacturer-specified'' as information provided by the manufacturer through manufacturer's installation instructions. AHRI 920–2020 uses the term ''manufacturer-specified'' in multiple locations throughout the standard,

[23] ''STI'' is defined in AHRI 920–2020 as additional instructions provide by the manufacturer and certified to the U.S. DOE. This final rule does not adopt certification or reporting requirements for DX–DOASes—such requirements will instead be proposed in a separate rulemaking.

including in Section 5.6 when describing the break-in conditions and duration,[24] however it does not define the term. DOE notes that Section 3.14 of AHRI 920–2020 does however contain a definition for ''manufacturer's installation instructions.'' Therefore, to clarify what is meant in AHRI 920–2020 when the term ''manufacturer-specified'' is used, DOE is establishing a definition for ''manufacturer-specified'' in section 2.2.1(a)(ii) of appendix B. This definition is the same used in AHRI 340/360–2022 (*i.e.,* Information provided by the manufacturer through manufacturer's installation instructions). Additionally, DOE is clarifying in section 2.2.1(b)(ii) of appendix B that the break-in conditions and duration specified in Section 5.6 of AHRI 920–2020 shall be ''manufacturer-specified'' and therefore shall be the conditions and duration included in the manufacturer's installation instructions, as defined in Section 3.14 of AHRI 920–2020.[25] DOE notes that the manufacturer's installation instructions includes the manufacturer's supplemental testing instructions (''STI''), because the STI definition is specified in Section 3.14.1 of AHRI 920–2020, and is therefore nested within the manufacturer installation instructions definition.[26] Hence, DOE is adopting the maximum 20-hour break-in provision in the DX–DOAS test procedure through reference to Section 5.6 of AHRI 920–2020, as enumerated in section 2.2.1(b) of appendix B, with the clarifications previously mentioned in this paragraph.

5. Ventilation Energy Recovery Systems

As discussed, DX–DOASes include units that provide pre-conditioning of outdoor air by direct or indirect transfer with return/exhaust air using an enthalpy wheel, sensible wheel, desiccant wheel, plate heat exchanger, heat pipes, or other heat or mass transfer apparatus. These pre-conditioning features are broadly referred to as VERS, and ASHRAE 90.1–2016 and 90.1–2019 define separate equipment classes and efficiency levels for DX–DOASes with VERS.

With regard to the test procedure, Section 5.4 of AHRI 920–2020 specifies testing requirements for DX–DOASes equipped with VERS. Section 5.4.1 of AHRI 920–2020 specifies that units equipped with VERS can be tested using either one of two options: ''Option 1'' or ''Option 2''. In general, Option 1 requires operating the DX–DOAS unit with VERS as it would operate in the field, maintaining the appropriate return air and outdoor air conditions for airflows entering the unit, and operating the VERS to provide energy recovery during the test (*see* Section 5.4.1.1 of AHRI 920–2020).[27] In addition to specifying the outdoor air dry-bulb temperature and humidity conditions, Table 4 and Table 5 of AHRI 920–2020 specify return air inlet conditions that are applicable to DX–DOASes with VERS. Section C2.4 in appendix C of AHRI 920–2020 also specifies that the return air be ducted into the unit from a separate test room maintaining the required return air inlet conditions.

Option 2 involves setting the conditions of the air entering the unit so as to simulate the conditions that would be provided by the VERS in operation (*see* Section 5.4.1.2 of AHRI 920–2020).[28] Option 2 uses energy recovery device performance ratings based on AHRI 1060 (I–P)-2018 (''AHRI 1060–2018'') to calculate the air dry-bulb temperature and humidity conditions that would be provided by the energy recovery device. AHRI 1060–2018 references ANSI/ASHRAE 84–2013, ''Method of Testing Air-to-Air Heat/Energy Exchangers,'' (ANSI/ASHRAE 84–2013) (approved by ASHRAE on January 26, 2013) for conducting the test. These industry test standards provide a method for rating the performance of VERS in terms of sensible and latent effectiveness. DOE also notes that the performance ratings for energy recovery devices certified using AHRI 1060–2018 are listed in AHRI's directory of certified product performance.[29]

The operating conditions specified in AHRI 1060–2018 may be different than the operating conditions specified for testing DX–DOAS (*i.e.,* airflow rate, which subsequently affects factors such as transfer/leakage airflow [30]). Hence, section C4 of AHRI 920–2020 provides methods to adjust, for the DX–DOAS operating conditions, the effectiveness values for sensible and latent transfer measured using AHRI 1060–2018. Section C4 of AHRI 920–2020 also provides default values for sensible effectiveness and latent effectiveness. These can be used in cases where performance rating information based on AHRI 1060–2018 is not available for a VERS, or the rotational speed for an energy recovery wheel has been changed from the speed used to determine performance ratings using AHRI 1060–2018.

The Option 2 approach would reduce test burden for most test laboratories by reducing the number of test rooms required as compared to conducting tests using Option 1. Because the outdoor ventilation air and return air would be maintained at the same conditions, there would be no transfer of heat or moisture in the VERS, nor any change of VERS-outlet supply air conditions associated with transfer or leakage of return air to the supply air plenum. In addition, testing using Option 2 is conducted with all components operating (*e.g.,* with an energy recovery wheel rotating, or with the pump of a glycol-water runaround loop activated), such that all measurements would be representative of the pressure drops and power consumption associated with the VERS. This approach avoids separate testing to

[24] Section 5.6 of AHRI 920–2020 states the following: Manufacturers may optionally specify a ''break-in'' period to operate the equipment under test prior to conducting the test. If an initial break-in period is required to achieve performance, the break-in conditions and duration shall be specified by the manufacturer, but shall not exceed 20 hours in length. No testing per Section 6 shall commence until the manufacturer-specified break-in period is completed. Each compressor of the unit shall undergo this ''break-in'' period.

[25] Section 3.14 of AHRI 920–2020 defines the manufacturers installation instructions as the following: ''Manufacturer's documents that come packaged with or appear in the labels applied to the unit(s). Online manuals are acceptable if referenced on the unit label or in the documents that come packaged with the unit. All references to ''manufacturer's instructions,'' ''manufacturer's published instructions,'' ''manufacturer's installation instructions,'' ''manufacturer's published recommendations,'' ''manufacturer installation and''.

[26] Section 3.14.1 of AHRI 920–2020 defines STI as the following: Additional instructions provided by the manufacturer and certified to the United States Department of Energy (DOE). STI shall include (a) all instructions that do not deviate from MII but provide additional specifications for test standard requirements allowing more than one option, and (b) all deviations from MII necessary to comply with steady state requirements. STI shall provide steady operation that matches to the extent possible the average performance that would be obtained without deviating from the MII. STI shall include no instructions that deviate from MII other than those described in (b) of this document.

[27] The Option 1 test method includes additional specificity to the test room configuration for testing DX–DOAS with energy recovery by allowing use of the three-chamber approach in addition to the example configuration provided in the current industry consensus test standard, in which the outdoor room is conditioned to both the required outdoor dry-bulb and humidity conditions.

[28] Option 2 is applicable for DX–DOASes for which a VERS provides the initial outdoor ventilation air treatment. DX–DOAS units with VERS that provide conditioning downstream of the conditioning coil could not be tested using Option 2, since this option addresses VERS pre-conditioning only upstream of the conditioning coil. Such units would need to be tested using Option 1.

[29] AHRI's directory of certified product performance for air-to-air energy recovery ventilators can be found at *www.ahridirectory.org/ahridirectory/pages/erv/defaultSearch.aspx.*

[30] DX–DOASes with energy recovery wheel VERS may experience air transfer and leakage from the outdoor air path to the exhaust air (outdoor air transfer and leakage) and return air to the supply air (return air transfer and leakage).

measure power input of auxiliary components or of the exhaust air fan.

In the July 2021 NOPR, DOE discussed its proposals regarding testing units with VERS, including how the following topics are treated in AHRI 920–2020: exhaust air transfer and leakage, purge angle setting, and target return airflow rate. 86 FR 36018, 36037–36040. DOE tentatively concluded that AHRI 920–2020 addressed each of these topics appropriately; therefore, DOE proposed to adopt Option 1 and Option 2, as specified in AHRI 920–2020. *Id.*

In response to the July 2021 NOPR, the CA IOUs commented that AHRI 1060 evaluates standalone heat exchanger performance only and encouraged DOE to evaluate the alignment between heat exchanger performance based on AHRI 1060 and whole system performance to assess the representativeness of the Option 2 approach. (CA IOUs, No. 25, p. 2)

NEEA commented that it supports the allowance of Option 2 as a less burdensome test method but encouraged DOE to validate the representativeness of the Option 2 test method through laboratory testing or field data. (NEEA, No. 24, p. 2) NEEA suggested that DOE consider a similar approach for other commercial package air-conditioning and heating equipment as a path to consider the energy savings benefits of VERS without adding testing burden. *Id.*

DOE tested a single DX–DOAS unit according to both Option 1 and Option 2 and has analyzed the difference between each option. DOE found that the measured ISMRE2 values differed by 0.1 (*i.e.,* 6.8 ISMRE2 with option 1 compared to 6.7 ISMRE2 with option 2), indicating a small level of variation when using either option.

Based on DOE test data, and lack of data indicating that option 2 is not representative of an average-use cycle, DOE is adopting the two options (*i.e.,* Option 1 and Option 2) for testing DX–DOASes with energy recovery, as provided in Section 5.4.1 of AHRI 920–2020 (as enumerated in section 2.2.1(b) of the proposed appendix B).

In response to the December 2021 SNOPR, the CA IOUs added to their comments regarding Option 2, indicating that, while they still support its use, they highlight a concern regarding AHRI's certification program for verifying VERS ratings developed based on AHRI 1060–2018. (CA IOUs, No. 31, pp. 2–3) Specifically, while ratings for VERS are allowed under the AHRI certification program for a wide range of conditions as specified in Table 1 of AHRI 1060–2018, the verification process associated with AHRI's certification program focuses on outdoor air entering conditions more narrowly focused on the Initial Summer and Initial Winter Verification Zones illustrated in Figure 1 of ''AHRI ERV Operations Manual, January 2022'' (AHRI ERV OM''). The Summer Zone is bounded by a dry bulb temperature range from 90 °F to 100 °F, lower humidity bound of 110 grains per pound of dry air, and upper humidity bound of 80 °F wet bulb temperature. It is DOE's understanding that verification tests focus more narrowly than the allowed range of rating conditions because laboratory determination of VERS sensible, latent, and total energy recovery effectiveness is not sufficiently precise to allow accurate measurement when entering outdoor conditions are closer to the entering return air condition. As these conditions get closer to each other, the temperature and humidity reduction in the air as it passes through the VERS approach the uncertainty of the temperature and humidity measurement. Hence, verification of rated effectiveness levels is most accurate if conducted for hot moist summer conditions and cold dry winter conditions, as is prescribed by the AHRI ERV OM. While there may be concerns that ratings of Option 2 DX–DOAS measurements for test conditions B, C, and D (for which temperature and humidity differences are less that would be used for AHRI verification of VERS performance) do not produce results which are comparable to ratings of Option 1, the tests DOE conducted comparing Option 1 and Option 2 measurements provide some assurance that using AHRI 1060 ratings is a reasonable approach to conducting Option 2 tests.

6. Defrost Energy Use for Air-Source Heat Pump

DX–DOAS defrost operation has an impact on efficiency in the field because of the energy use associated with defrost and because a unit cannot continue to provide heating during defrost operation, thereby reducing time-averaged capacity. Therefore, consideration of defrost could provide a more field-representative measurement of performance. DOE notes that tests conducted at 35 °F dry-bulb temperature for consumer central air conditioning heat pumps (which are air-source) consider the impacts of defrosting of the outdoor coil in the energy use measurement (see 10 CFR part 430, subpart B, appendix M, section 3.9), while defrost performance is not addressed in ANSI/ASHRAE 198–2013 or AHRI 920–2020.

In the July 2021 NOPR, DOE acknowledged challenges in defrost field operation for DX–DOASes. Preventing cold outdoor air from being brought into the supply air stream during a defrosting sequence (when the DX–DOAS cannot operate as a heat pump) would require interruptions to the supply airflow, which is inconsistent with building code requirements to provide a continuous supply of ventilation air for most DX–DOAS applications. 86 FR 36018, 36036. DOE also noted that AHRI 920–2020 addresses defrost in another fashion, namely by providing in Section 5.5 that defrost control settings specified by the manufacturer in installation instructions may be set prior to heating mode tests in order to achieve steady-state conditions during the heating mode tests, and that if these settings fail to prevent frost accumulation during the heating mode tests (resulting in unsteady conditions), then the manufacturer would need to seek a waiver from the test procedure to obtain an alternate method of test from DOE pursuant to 10 CFR 431.401. Additionally, DOE noted that Section 5.5 of AHRI 920–2020 also specifies that the Standard Rating Condition F heating mode test (which represents low temperature environmental conditions where frosting is likely) is optional to conduct, and if the Standard Rating Condition F test is not conducted, a default COP of 1.0 (corresponding to electric resistance heating) is assigned at this rating point instead. Therefore, DOE tentatively concluded that the test method set forth in Section 5.5 of AHRI 920–2020 for defrost controls for air-source heat pump DX–DOASes during heating mode offers a reasonable and workable approach, and that due to the lack of sufficient information on how air-source heat pump DX–DOAS units operate under frosting conditions, DOE would not propose to include any provisions for including the defrost energy of DX–DOAS air-source heat pumps. *Id.*

DOE received no comments on this topic in response to the July 2021 NOPR. For the reasons discussed in the prior paragraph and in the July 2021 NOPR, DOE is adopting the provisions of AHRI 920–2020 Section 5.5, as enumerated in section 2.2.1(b) of the proposed appendix B and is not establishing provisions for including defrost energy in the DX–DOAS test procedure.

7. Return External Static Pressures

In the July 2021 NOPR, DOE proposed to adopt the ESP requirements set forth in AHRI 920–2020, which includes the return air ESP requirements specified in Table 7 of AHRI 920–2020. 86 FR 36018,

36040. DOE received comment from the CA IOUs stating that they supported the adoption of the minimum ESPs provided in AHRI 920–2020 but that the minimum return ESPs appeared to be unrealistically high, especially for equipment with airflow below 900 scfm. (CA IOUs, No. 25, p. 3) The also CA IOUs asserted that changing the minimum ESPs for the return air stream would only affect the exhaust fan power of DX–DOASes with VERS and would likely have little impact on the representativeness of the metric. *Id*

DOE did not receive any data supporting the CA IOUs assertion that return air ESPs are unrealistically high, or any justification supporting their claim that ESPs appear to be unrealistically high. Absent further indication that the return air ESPs specified in AHRI 920–2020 are inappropriate and based on the CA IOUs comment that changing the minimum ESPs would likely have little impact on the representativeness of the metric, DOE concludes that the return air ESPs meet the statutory requirements of 42 U.S.C. 6314(a)(2)–(3). As such, DOE is adopting the ESP requirements in AHRI 920–2020 through reference to Section 6 (Rating Requirements) of AHRI 920–2020 in section 2.2.1(c) of appendix B.

8. Tolerances for Supply and Return Airflow and External Static Pressure

In the July 2021 NOPR, DOE proposed to adopt the test condition and operating tolerances for airflow and ESP specified in Section 6.1.5 of AHRI 920–2020. 86 FR 36019, 36014. Specifically, DOE noted that Section 6.1.5 of AHRI 920–2020 specifies airflow test condition tolerances of ±3 percent of the manufacturer-provided airflow rate for all DX–DOASes when setting the airflow, provided that this airflow rate meets the supply air dew point temperature requirement, and that for setting the return airflow rate, Section 6.1.5 of AHRI 920–2020 specifies the same test condition tolerances as for supply airflow rate, except that for return airflow rate the target is equal to the measured supply airflow rate. *Id.* DOE noted that ANSI/ASHRAE 198–2013 provides a 5-percent operating tolerance directly on the airflow rate, Table 9 of AHRI 920–2020 provides a 5-percent operating tolerance for airflow rate in the form of airflow nozzle differential pressure. *Id.* DOE tentatively determined that the airflow operating tolerance approach in AHRI 920–2020 is preferable because the airflow nozzle differential pressure provides a more direct indication of the airflow variation, since airflow is calculated based on this value. *Id.* These operating tolerances, in addition to the condition tolerances for setting airflow, would maintain repeatable and reproducible results while ensuring that testing is representative of field use.

DOE did not receive any comments regarding DOEs proposal in the July 2021 NOPR. For the reasons discussed in the prior paragraph and in the July 2021 NOPR, DOE is establishing the test condition and operating tolerances for airflow and ESP specified in Section 6.1.5 of AHRI 920–2020, as enumerated in section 2.2.1(c) of the proposed appendix B.

9. Secondary Dehumidification and Heating Capacity Tests

The measurement of dehumidification and heating performance of DX–DOASes is based on measurements of airflow rate, temperature, and humidity, which have uncertainties associated with them. Thus, a secondary test method may be essential to confirm the accuracy of the primary test method. Commercial package air-conditioners and heat pumps with cooling capacity less than 135,000 Btu/h are required to undergo a secondary test to verify the cooling or heating capacity and energy efficiency results (*See, e.g.,* ANSI/ASHRAE 37–2009 Section 7.2.1, which is referenced by appendix A to subpart F of 10 CFR part 431). ANSI/ASHRAE 198–2013 does not specify a secondary test method for verifying the dehumidification and heating capacity of DX–DOAS, but Section 6.7 of AHRI 920–2020 does specify secondary tests.

In the July 2021 NOPR, DOE noted that Section C5.1 of AHRI 920–2020 includes a condensate-based test method as a secondary measure of dehumidification capacity. 86 FR 36018, 36041. DOE noted that this method measures the weight of the condensate (*i.e.,* water vapor in the outdoor ventilation air that condenses on the conditioning coil and is removed from the air) collected during the dehumidification test and uses it to calculate a secondary measure of MRC, and that this secondary measure of MRC is then compared to the primary MRC measurement, which is based on supply and outdoor ventilation airflow and air condition measurements. DOE noted that AHRI 920–2020 requires this secondary measure of MRC for all dehumidification tests, and comparison to the primary measure of MRC at Standard Rating Condition A, and that this requirement is for all DX–DOAS units that: (a) do not use condensate collected from the dehumidification coil to enhance condenser cooling or include a secondary dehumidification process for which the moisture removed from the supply air stream is not collectable in liquid form, and (b) either are not equipped with VERS or are equipped with VERS and tested using Option 2 (*see* Section C5.1 of AHRI 920–2020). Additionally, DOE noted that AHRI 920–2020 does not require a secondary dehumidification capacity measurement for DX–DOAS units equipped with VERS that are tested using Option 1, and that DOE understands that this is because: (a) no viable method has been developed and validated that appropriately accounts for the water vapor that transfers between air streams of an energy recovery wheel, and (b) the test burden of accounting for moisture in the exhaust air stream would be excessive. Therefore, DOE proposed to adopt the secondary capacity test measurements specified in AHRI 920–2020 (Section C5.1 *Dehumidification Capacity Verification*), including the cooling condensate secondary test measurement discussed previously.

For DX–DOAS units with energy recovery tested using Option 2, as previously discussed in section III.E.5 of this document, the test is conducted by setting the conditions of the air entering the unit (at both the outdoor air inlet and return air inlet) to simulate the conditions that would be provided by the energy recovery device in operation. As a result, the moisture removal (in dehumidification mode) or heating (in heating mode for heat pump DX–DOAS) measured during the Option 2 primary and secondary capacity tests reflects only the moisture removed or heating by the conditioning coil. The MRC or q_{hp} for the DX–DOAS is calculated by adjusting the measured moisture removal or heating for the primary test to account for the total moisture removal or heating by the energy recovery device and the conditioning coil. Because the moisture removal or heating capacity measured for the primary and secondary tests are based on the simulated test conditions, Sections 6.9 and 6.10 of AHRI 920–2020 use these measured values for the secondary capacity verification under Option 2. In the July 2021 NOPR, DOE proposed to adopt these requirements specified in AHRI 920–2020 (Section 6.9 *Moisture Removal Efficiency Ratings* and Section 6.10 *Heating Capacity*).

DOE did not receive any comment on these proposals. For the reasons discussed in the prior paragraph and in the July 2021 NOPR, DOE is establishing the condensate-based secondary capacity measurement requirements as proposed in the July 2021 NOPR through reference to Section 6 of AHRI 920–2020, as enumerated in section 2.2.1(c) of appendix B.

10. Water Pump Effect

As part of the July 2021 NOPR, DOE noted that Section 6.1.6.4 of AHRI 920–2020 includes an equation for calculating the ''water pump effect,'' which is an estimate of the energy consumption of non-integral water pumps (*i.e.,* pumps that are not part of the DX–DOAS unit and whose power consumption would, therefore, not already be part of the measured power). 86 FR 36018, 36034. The calculation at Section 6.1.5.4 of AHRI 920–2020 applies the water pump effect to all water-cooled and water-source units. DOE noted that for pumps that are integral to the DX–DOAS, the total pump effect does not need to be calculated because the power for these pumps would be measured as part of the main DX–DOAS power measurement, and that currently, the number of DX–DOAS models on the market with integral pumps is very limited. *Id.*

In the July 2021 NOPR, DOE also noted that AHRI 920–2020 does not explicitly state the amount of external head pressure [31] to use when testing DX–DOASes with integral pumps, and that the calculation of the water pump effect for DX–DOASes without integral pumps specified AHRI 920–2020 includes a fixed adder of 25 Watts per gallon per minute based on 20 feet of water column of external head pressure. 86 FR 36018, 36034. DOE tentatively determined that the external head pressure value specified for DX–DOASes without integral pumps would be appropriate for DX–DOASes with integral pumps, and that specifying an external head pressure for units with integral pumps is necessary to ensure test repeatability because the external heat pressure will impact the pump power output. *Id.* Therefore, DOE proposed to include additional specifications in the DOE test procedure that DX–DOASes with integral pumps be configured with an external head pressure equal to 20 feet of water column (*i.e.,* the same level of external head pressure used in the calculation of the pump effect for DX–DOASes without integral pumps). 86 FR 36018, 36035. In addition, DOE proposed a condition tolerance [32] of up to 1 foot of water column greater than the 20-foot requirement (which equates to 5 percent), which is equivalent to the condition tolerance on air side ESP in Table 9 of AHRI 920–2020 (*i.e.,* .05 inch of water column greater than the target ESP, which is around 1 inch of water column). *Id.* Similarly, DOE proposed an operating tolerance [33] of up to 1 foot of water column, which is equivalent to the operating tolerance on air side ESP in Table 9 of AHRI 920–2020 (*i.e.,* 0.05 inch of water column). *Id.*

In the July 2021 NOPR, DOE requested comment on its proposal to require that water-cooled and water-source DX–DOASes with integral pumps be set up with an external pressure rise equal to 20 feet of water column with a condition tolerance of −0/+1 foot and an operating tolerance of 1 foot. *Id.*

AHRI, the Joint Advocates, and MIAQ supported DOE's proposed requirements for DX–DOASes with integral water pumps. (AHRI, No. 22, p. 7; Joint Advocates, No. 21; p.1; MIAQ, No. 19, p. 3) AHRI and MIAQ recommended that DOE's additional requirement for water-cooled and water-source DX–DOASes with integral pumps should be written in language consistent with that in AHRI 920–2020. AHRI stated that AHRI 920–2020 includes the maximum permissible variations of the average of the test observations from the standard or desired test conditions in the ''Test Condition Tolerance'' column of Table 9, ''Test Operating and Test Condition Tolerances'', in AHRI 920–2020. This represents the greatest permissible difference between maximum and minimum instrument observations during the test. (AHRI, No. 22, p. 7; MIAQ, No. 19, p. 3) The Joint Advocates stated that DOE's proposal would ensure that equipment with integral pumps is tested in a consistent manner and would align with the calculation for DX–DOASes without integral pumps. (Joint Advocates, No. 21, p.1)

DOE notes that AHRI's comment implies that a test condition tolerance is the maximum permissible variations of the average of the test observations from the standard or desired test conditions, *and* the maximum permissible difference between maximum and minimum instrument observations during the test. DOE disagrees with this implication, and notes that while the condition tolerance is the maximum permissible variations of the average of the test observations from the standard or desired test conditions, the operating tolerance is the greatest permissible difference between maximum and minimum instrument observations during the test. This is consistent with industries use of the terms ''operating and condition tolerance'', noted in Sections 6.3.1 and 6.3.2 of AHRI 340/360–2019, for example. DOE also notes that Table 9 in AHRI 920–2020 simply indicates what the test and operating condition tolerances are, without specific language describing them.

Adopting the operating and condition tolerances on head pressure of DX–DOASes with integral pumps proposed in the July 2021 NOPR is consistent with the approached use for air side ESPs specified in AHRI 920–2020, which does not specify any such tolerances for external head pressure. DOE has determined that using the language in Appendix B, which adopts these operating and condition tolerances, aligns with the intent of the operating and condition tolerances specified in Table 9 of AHRI 920–2020. Similarly, adding a requirement that DX–DOASes with integral pumps be configured with a target external head pressure equal to 20 feet of water column is consistent with the treatment of DX–DOASes without integral pumps in AHRI 920–2020. To the extent the industry test procedure does not specify a target external head pressure, as well as a condition tolerance and operating tolerance for the water column, the industry test procedure would not ensure consistent and comparable results and would not ensure that the results reflect the equipment's representative average energy efficiency or energy use. DOE has determined that absent such a target and tolerances for the water column, the test procedure would not meet the representativeness requirement of 42 U.S.C. 6314(a)(2). As such, and consistent with stakeholder recommendations, DOE is adopting the supplemental specification for water-cooled and water-source DX–DOASes in section 2.2.1(c)(ii) of appendix B.

11. Calculation of the Degradation Coefficient

In the July 2021 NOPR, DOE noted that equation 20 in Section 6.9.2 of AHRI 920–2020 appears to incorrectly attribute the lower degradation coefficient to DX–DOASes operating *with* VERS and proposed to correct this by specifying in section 2.2.1(c)(iii) of appendix B that equation 20 is to be used for DX–DOASes ''*without* VERS, with deactivated VERS (*see* Section 5.4.3 of AHRI 920–2020), or with sensible-only VERS tested under Standard Rating Conditions other than D''. 86 FR 36018, 36042.

In response to the December 2021 SNOPR, the CA IOUs recommended

[31] ''External head pressure'' reflects the pump power output, in that it represents the height to which the pump can raise the water if the water were being moved opposite the force of gravity.

[32] A condition tolerance is the maximum permissible difference between the average value of the measured test parameter and the specified test condition.

[33] An operating tolerance is the maximum permissible range of a measurement that shall vary over the specified test interval. Specifically, the difference between the maximum and minimum sampled values shall be less than or equal to the specified test operating tolerance.

DOE consider incorporating by reference AHRI 920–2020 with Addendum, rather than AHRI 920–2020, because it makes a clarifying edit to Section 6.9.2. (CA IOUs, No. 31, p. 1) Upon review, DOE recognizes that this addendum makes the same correction to equation 20 that DOE identified, and that this is the only change made by the addendum. DOE received no further comment on this topic in response to the July 2021 NOPR. The version of AHRI 920–2020 (*i.e.,* with the addendum) that DOE is adopting in this final rule as the test procedure for DX–DOASes is consistent with the proposed correction in the July 2021 NOPR. As such, DOE is not separately specifying the correction in this final rule.

12. Calculation of Supplementary Heat Penalty

In the July 2021 NOPR, DOE noted that the term for supply airflow rate is missing from the supplementary heat penalty equations in Section 6.1.3.1 of ANSI/AHRI 920–2015. This issue is in fact resolved in Section C6.1 in AHRI 920–2020, as referenced by Section 6.3.2 of AHRI 920–2020, thereby resolving the problem noted by DOE. 86 FR 36018, 36043. DOE also noted that AHRI 920–2020 contains several minor clarifications that clarify when the supplemental heating penalty should apply. *Id.* DOE received no further comment on this topic. For the reasons discussed in the July 2021 NOPR, DOE is adopting the supplementary heat penalty provisions in AHRIAHRI 920–2020 through reference to Section 6 (Rating Requirements) of AHRI 920–2020, as enumerated in section 2.2.1(c) of appendix B.

13. Water-Cooled and Water-Source Heat Pump DX–DOAS

In the July 2021 NOPR, DOE discussed the following additional topics related to water-cooled and water-source heat pump DX–DOAS equipment: (1) test conditions for multiple-inlet water sources; (2) condenser liquid flow rate; and (3) energy consumption of heat rejection fans and chillers. 86 FR 36018, 36033–36035.

Regarding test conditions for multiple-inlet water sources, DOE noted that AHRI 920–2020 provides separate inlet fluid rating conditions for different water-cooled and water-source heat pump DX–DOAS applications, but some are identified as optional application rating conditions. 86 FR 36018, 36033. More specifically, Table 4 of AHRI 920–2020 includes separate inlet fluid rating conditions for water-cooled cooling tower and water-cooled chilled water operating conditions but Note 3 to Table 4 of AHRI 920–2020 indicates that the water-cooled chilled water condition is the optional application rating condition. Table 5 of AHRI 920–2020 includes separate inlet fluid rating conditions for water-source and ground-source closed-loop heat pump operating conditions but identifies the ground-source closed-loop conditions as the optional application rating condition. Tables 4 and 5 of AHRI 920–2020 also revise the inlet temperatures of the rating conditions for water-cooled cooling tower, water-source heat pump, and water-source ground-source closed-loop heat pump DX–DOASes, compared to the inlet temperatures of the rating conditions in AHRI 920–2015. *Id.* In the July 2021 NOPR, DOE proposed to adopt the water/fluid rating conditions provided in AHRI 920–2020 (Section 6 of AHRI 920–2020, which includes Table 4 and Table 5), including the chilled water and ground-source closed-loop conditions specified as optional in AHRI 920–2020 so as to allow for voluntary representations for those applications.[34] In the July 2021 NOPR, DOE noted that in any future energy conservation standards rulemaking for DX–DOASes, DOE would consider establishing standards and the corresponding certification requirements based on measurement using inlet fluid temperature conditions designated ''Condenser Water Entering Temperature, Cooling Tower Water'' and ''Water-Source Heat Pumps'' provided in Table 4 and Table 5 of AHRI 920–2020, respectively. *Id.* DOE notes that this is consistent with what was proposed in the February 2022 ECS NOPR. 87 FR 5560, 5567.

Regarding condenser liquid flow rate, DOE noted that more specifically, Section 6.1.6.1 of AHRI 920–2020 specifies that the water flow rate be specified by the manufacturer, and that the test method must deliver a liquid temperature rise no less than 8 °F when testing under Standard Rating Condition A. 86 FR 36018, 36033. Additionally, Section 6.1.6.2 of AHRI 920–2020 requires that the flow rate set under Standard Rating Condition A be used for testing at the remaining Standard Rating Conditions (B through F), unless automatic adjustment of the liquid flow rate is provided by the equipment, and it also requires that if condenser water flow rate is modulated under part-load conditions, the flow rate must not exceed the flow rate set for Condition A. DOE tentatively concluded that these provisions would be representative of flow rates used during an average use cycle and would not be unduly burdensome to conduct, and proposed to adopt the liquid flow requirements in AHRI 920–2020 for water-cooled and water-source heat pump DX–DOASes (Section 6 of AHRI 920–2020, which includes Section 6.1.6 Liquid Flow Rates for Water-Cooled, Water-Source Heat Pump, and Ground-Source Heat Pump). *Id.*

Regarding energy consumption of heat rejection fans and chillers, AHRI noted that AHRI 920–2020 does not address accounting for the energy consumption of heat rejection fans (*e.g.*, cooling tower fans) or chiller systems used to provide chilled water to DX–DOASes with chilled-water-cooled condensers. 86 FR 36018, 36035. DOE noted that accounting for this energy use is not a consistent industry practice, as evidenced by the differences between the AHRI 340/360–2007 (which provides a power consumption adjustment for both the cooling tower fan and the circulating water pump) for more typical commercial package air conditioning equipment, and the ISO approach (which does not account for cooling tower fan energy use at this time) for water-source heat pumps. DOE also noted that including the energy of the heat rejection fan and chiller systems would not help to distinguish between models of different efficiency, since the adder would be identical for two same-capacity models with different efficiencies. For these reasons, and consistent with AHRI 920–2020, DOE proposed not to include any energy consumption associated with heat rejection fans, cooling towers, or chiller systems used to cool the water loops of water-cooled or water-source DX–DOASes. *Id.*

DOE did not receive additional comments regarding these topics or DOE's related proposals. For the reasons discussed in the prior paragraphs and in the July 2021 NOPR, DOE is adopting the water-cooled and water-source heat pump DX–DOAS provisions in AHRI 920–2020 that were presented in the July 2021 NOPR (*i.e.,* Section 6 of AHRI 920–2020, which includes Table 4 and Table 5, as enumerated in section 2.2.1(c) of the proposed appendix B).

[34] In the July 2021 NOPR and December 2021 SNOPR, DOE inadvertently indicated in the proposed section 2.2.3 of appendix B that for water-cooled DX–DOASes, the ''condenser water entering temperature, cooling tower'' conditions specified in Table 4 of AHRI 920–2020 are optional, and that for water-source heat pump DX–DOASes, the ''water-source heat pump'' conditions specified in Table 5 of AHRI 920–2020 are optional. DOE did not mean to indicate this because these are the required test conditions, not the conditions for making optional representations. DOE has corrected this error in this final rule.

14. Airflow Measurement Apparatus

In the July 2021 NOPR, DOE noted that Figures 1 and 2 of ANSI/ASHRAE 198–2013 present the typical test set-up for DX–DOASes with and without energy recovery, and that the figures show airflow and condition measuring apparatus at both the inlet and the outlet ends of each airflow path (*i.e.,* the outdoor/supply and return/exhaust paths). 86 FR 36018, 36030. DOE tentatively concluded that requiring two airflow-measuring apparatus per airflow path may be unduly burdensome in certain instances; Section C2.2 of AHRI 920–2020, among other things, requires one airflow-measuring apparatus per airflow path; and that use of one airflow-measuring apparatus offers a more suitable approach to airflow measurement. *Id.* Additionally, DOE noted that the requirement for just one airflow-measuring apparatus per airflow path is consistent with the DOE test procedures for all other commercial and residential air-conditioning and heating systems and limits the testing costs and burden on manufacturers. *Id.* Therefore, DOE proposed to adopt the provisions for the airflow-measuring apparatus specified in Section C2.2 of AHRI 920–2020 (rather than the dual measurement apparatus specifications in Figures 1 and 2 of ANSI/ASHRAE 198–2013).

DOE received no comment on this proposal. For the reasons discussed in the prior paragraph and in the July 2021 NOPR, DOE is adopting the provisions for a single airflow-monitoring apparatus in Appendix C of AHRI 920–2020, as enumerated in section 2.2.1(f) of appendix B.

15. Demand-Controlled Ventilation

DX–DOAS units are often used in demand-controlled ventilation (''DCV'') operation, which regulates the building ventilation requirement based on parameters such as building occupancy. During periods of non-occupancy, which could represent a significant portion of field-use, the DCV system controls the unit to operate at a low airflow rate, thereby reducing the unit's overall energy use. DX–DOASes using DCV systems are typically equipped with variable-speed supply fans that can be adjusted to meet changing ventilation needs.

In the July 2021 NOPR, DOE stated that DOE is not aware of representative field data regarding the typical DX–DOAS duty cycle when operating with DCV and, thus, the characterization of DCV performance would be an important first step in considering this control feature under the test procedure. 86 FR 36018, 36040. DOE stated that adopting additional testing requirements to capture the effect of DCV could significantly increase testing cost and complexity. Given the lack of data on in-field performance and the anticipated additional testing burden of such a test, DOE tentatively decided not to include performance under DCV operation in its proposed test procedure for DX–DOASes at this time. *Id.*

DOE received no comments on this proposal. For the reasons discussed in the prior paragraph and in the July 2021 NOPR, DOE is not adopting provisions specific to DCV operation.

F. Configuration of Unit Under Test

1. Background and Summary

DX–DOASes are sold with a wide variety of components, including many that can optionally be installed on or within the unit both in the factory and in the field. In all cases, these components are distributed in commerce with the DX–DOAS, but can be packaged or shipped in different ways from the point of manufacturer for ease of transportation. Each optional component may or may not affect a model's measured efficiency when tested to the DOE test procedure adopted in this final rule. For certain components not directly addressed in the DOE test procedure, this final rule provides more specific instructions on how each component should be handled for the purposes of making representations in part 429. Specifically, these instructions provide manufacturers clarity on how components should be treated and how to group individual models with and without optional components for the purposes of representations to reduce burden. DOE is adopting these provisions in part 429 to allow for testing of certain individual models that can be used as a proxy to represent the performance of equipment with multiple combinations of components.

DOE is handling DX–DOAS components in two distinct ways in this final rule to help manufacturers better understand their options for developing representations for their differing product offerings. First, the treatment of certain components is specified by the test procedure, such that their impact on measured efficiency is limited. For example, a return air damper must be set in the closed position and sealed during testing, resulting in a measured efficiency that would be similar or identical to the measured efficiency for a unit without a return damper. Second, DOE is adopting provisions expressly allowing certain models to be grouped together for the purposes of making representations and allowing the performance of a model without certain optional components to be used as a proxy for models with any combinations of the specified components, even if such components would impact the measured efficiency of a model. A furnace is an example of such a component. The efficiency representation for a model with a furnace is based on the measured performance of the DX–DOAS as tested without the component installed because the furnace is not easily removed from the DX–DOAS for testing.[35]

The following sections describe DOE's proposals for addressing such components in the July 2021 NOPR and December 2021 SNOPR, comments received in response to the proposals, and the approach established in this final rule.

2. Approach for Addressing Certain Components

a. Proposals

Appendix F of AHRI 920–2020 provides discussion of certain components, which the committee developing the standard does not believe should be considered for individual model representations, and the standard provides instructions either to limit their impact during testing or to determine representations for individual models with such components based on individual models that do not include them. DOE proposed in the July 2021 NOPR to implement representation provisions for certain components by incorporating by reference appendix F of AHRI 920–2020. 86 FR 36018, 36045.

In the December 2021 SNOPR, DOE revised its proposals from the July 2021 NOPR to be more consistent with DOE's regulatory provisions and to provide clarity on how these DOE provisions would be implemented for both certification and enforcement testing. 86 FR 72874, 72879 (December 23, 2021). DOE noted that the revised approach would clarify how to test a specific unit and which model to test as the basis for efficiency representations of a group of individual models. Specifically, DOE proposed to include in the new appendix B to 10 CFR part 431 provisions for certain components to limit their impact on efficiency during testing. *Id.* Additionally, DOE proposed representation requirements in 10 CFR 429.43(a)(4) that explicitly allow

[35] Note that in certain cases, as explained further in section III.F.2.d of this document, the representation may have to be based on an individual model with a furnace.

representations for individual models equipped with certain components to be based on testing of individual models without those components installed—the proposal includes a table listing the components for which these provisions would apply (furnaces and steam/hydronic heat coils, ducted condenser fans, sound traps/sound attenuators, and VERS preheat). *Id.* Finally, DOE proposed specific product enforcement provisions in 10 CFR 429.134 indicating that DOE would conduct enforcement testing on individual models that do not include the components listed in the aforementioned table, except in certain circumstances. *Id.* at 86 FR 72880.

b. General Comments

DOE received multiple comments related to these proposals in response to the December 2021 SNOPR. While comments were received on details of the proposed provisions, *e.g.,* regarding the specific components that should or should not be included in Table 1 to paragraph (a)(4)(i),[36] no comments received specifically addressed the general restructuring of the provisions in the regulations.

ASAP and NYSERDA generally supported DOE's proposals related to specific components. (ASAP and NYSERDA, No. 32, p. 1) AHRI and MIAQ generally supported the proposals in the December 2021 SNOPR regarding specific components; however, they expressed concerns that DOE would potentially consider adding certification reporting requirements such that manufacturers would be required to certify which otherwise identical models are used for making representations of basic models that include individual models with specific components, similar to how test combinations are certified for consumer central air conditioners and heat pumps, and that such a structure would result in thousands of basic models and would be overly burdensome. (AHRI, No. 34, p. 4–5; MIAQ, No. 29, p. 4)

DOE has considered these general comments, as well as those discussed in the following sections, and has determined that clarifications are warranted to the approach proposed in the December 2021 SNOPR regarding the treatment of certain components for determining represented values. Therefore, DOE is adopting the proposals made in the December 2021 SNOPR, with clarifications that are discussed in detail in section III.F.2.c through III.F.2.f of this final rule. Additionally, regarding the comment from AHRI and MIAQ pertaining to DOE potentially requiring future certification of otherwise identical models, DOE has concluded that the approach in this final rule may preclude the need for such certification requirements, but certification requirements for DX–DOASes in general will be considered, if needed, in a separate rulemaking.

c. Components Addressed Through Test Provisions of 10 CFR Part 431 Appendix B

DOE is adopting test provisions at 10 CFR part 431 appendix B section 2.2.2 to prescribe how certain components must be configured for testing as proposed in the December 2021 SNOPR. Specifically, DOE is requiring in appendix B that steps be taken during unit setup and testing to limit the impacts on the measurement of these components:

- Return and Exhaust Dampers
- Ventilation Energy Recovery System (VERS) Bypass Dampers
- Fire/Smoke/Isolation Dampers
- Furnaces and Steam/Hydronic Heat Coils
- Power Correction Capacitors
- Hail Guards
- Ducted Condenser Fans
- Sound Traps/Sound Attenuators
- Humidifiers
- UV Lights
- High-Effectiveness Indoor Air Filtration

The components are listed and described in Table 2.1 in section 2.2.2 of the new appendix B, and test provisions for them are provided in the table.

d. Components Addressed Through Representation Provisions of 10 CFR 429.43

As discussed, in the December 2021 SNOPR, DOE proposed representation requirements in 10 CFR 429.43(a)(4) that explicitly allowed representations for individual models with certain components to be based on testing for individual models without those components—the proposal included a table (''Table 1 of 10 CFR 429.43'') listing the components for which these provisions would apply (furnaces and steam/hydronic heat coils, ducted condenser fans, sound traps/sound attenuators, and VERS preheat). 86 FR 72874, 72879 (December 23, 2021).

In response to the December 2021 SNOPR, Carrier supported DOE's approach of assessing compliance of equipment with exempted specific components present when only individual models with that component are distributed in commerce. (Carrier, No. 30, p. 2) Carrier also supported DOE's proposal that if a basic model includes both individual models with and without the exempted component, then compliance may be assessed on the model without the exempted component. *Id.* Additionally, ASAP and NYSERDA commented that in cases where individual models include more than one of the listed specific components, the ratings must be representative of the lowest efficiency. (ASAP and NYSERDA, No. 32, p. 1)

In this final rule, DOE is making two clarifications to the representation requirements as proposed in the December 2021 SNOPR. First, DOE is specifying that the basic model representation must be based on the least-efficient individual model that is a part of the basic model and clarifying how this long-standing basic model provision interacts with the component treatment in § 429.43 that is being adopted. Adoption of this clarification in the regulatory text is consistent with the December 2021 SNOPR, in which DOE noted that in some cases, individual models may include more than one of the specified components or there may be individual models within a basic model that includes various dehumidification components that result in more or less energy use. 86 FR 72874, 72880. In such cases, DOE stated that the represented values of performance must be representative of the individual model with the lowest efficiency found within the basic model. *Id.* DOE believes regulated entities may benefit from clarity in the regulatory text as to how the least efficient individual model within a basic model provision works with the component treatment for DX–DOASes. The amendments in this final rule explicitly state that the exclusion of the specified components from consideration in determining basic model efficiency in certain scenarios is an exception to basing representations on the least efficient individual model within a basic model. In other words, the components listed in § 429.43 are not being considered as part of the representation under DOE's regulatory framework if certain conditions are met as discussed in the following paragraphs and thus, their impact on efficiency is not reflected in the representation. In this case, the basic model's representation is generally determined by applying the testing and sampling provisions to the least efficient individual model in the basic model that does not have a component listed in § 429.43.

Second, DOE is also clarifying instructions for instances when

[36] These comments are discussed in sections III.F.2.d, III.F.2.d.1, and III.F.2.d.2 of this document.

individual models within a basic model may have more than one of the specified components and there may be no individual model without any of the specified components. DOE is adopting the concept of an ''otherwise comparable model group'' (''OCMG'') instead of using the proposed ''otherwise identical'' provisions. An OCMG is a group of individual models within the basic model that do not differ in components that affect energy consumption as measured according to the applicable test procedure other than the specific components listed in Table 1 of 10 CFR 429.43, but may include individual models with any combination of such specified components. Therefore, a basic model can be composed of multiple OCMGs, each representing a unique combination of components that affect energy consumption as measured according to the applicable test procedure, other than the specified excluded components listed in Table 1 of 10 CFR 429.43. For example, a manufacturer might include two tiers of control system within the same basic model, in which one of the control systems has sophisticated diagnostics capabilities that require a more powerful control board with a higher wattage input. DX–DOAS individual models with the ''standard'' control system would be part of OCMG A, while individual models with the ''premium'' control system would be part of a different OCMG B, since the control system is not one of the specified exempt components listed in Table 1 of 10 CFR 429.43. However, both OCMGs may include different combinations of furnaces, sound traps, and VERS preheat. Also, both OCMGs may include any combination of characteristics that do not affect the efficiency measurement, such as paint color.

The OCMG is used to determine which individual models are used to determine a represented value. Specifically, when identifying the individual model within an OCMG for the purpose of determining a representation for the basic model, only the individual model(s) with the least number (which could be zero) of the specific components listed in Table 1 of 10 CFR 429.43 is considered. This clarifies which individual models are exempted from consideration for determination of represented values in the case of an OCMG with multiple specified components and no individual models with zero specific components listed in Table 1 of 10 CFR 429.43—*i.e.,* models with a number of specific components listed in Table 1 of 10 CFR 429.43 greater than the least number in the OCMG are exempted. In the case that the OCMG includes an individual model with no specific components listed in Table 1 of 10 CFR 429.43, then all individual models in the OCMG with specified components would be exempted from consideration. The least efficient individual model across the OCMGs within a basic model would be used to determine the representation of the basic model. In the case where there are multiple individual models within a single OCMG with the same non-zero least number of specified components, the least efficient of these would be considered. DOE has illustrated the OCMG concept in an attempt to clarify this approach in the ''Illustration of Specified Components Requirements'' document.[37]

DOE relies on the term ''comparable'' as opposed to ''identical'' to indicate that for the purpose of representations, the components that impact energy consumption as measured by the applicable test procedure are the relevant components to consider—differences such as unit color and presence of utility outlets would not warrant separate OCMGs.

The use of the OCMG concept results in representations being based on the same individual models as the approach proposed in the December 2021 SNOPR, *i.e.,* the represented values of performance are representative of the individual model(s) with the lowest efficiency found within the basic model, excluding certain individual models with the specific components listed in Table 1 of 10 CFR 429.43. Further, the approach as adopted in this final rule is structured to more explicitly address individual models with more than one of the specific components listed in Table 1 of 10 CFR 429.43, as well as instances in which there is no comparable model without any of the specified components.

In response to the December 2021 SNOPR, DOE also received comments regarding the inclusion or exclusion of specific components in Table 1 of 10 CFR 429.43, as discussed in the following sections.

(1) Furnaces

In the December 2021 SNOPR, DOE proposed that furnaces would be a specific component specified in 10 CFR 429.43 for exclusion, consistent with the treatment of this feature in AHRI 920–2020. Therefore, if a manufacturer includes individual models distributed in commerce without furnaces within the same basic model as individual models distributed in commerce with a furnace, manufacturers would be able to determine represented values for the basic model based on the performance of an individual model without a furnace installed if it complies with the requirements discussed in section III.F.2.d of this document. 86 FR 72874, 72870–72880.

The CA IOUs commented that DOE's proposal for allowing furnaces to be specific components that are optional for testing is not consistent with the approach in AHRI 340/360–2019. They urged DOE to consider the measurable energy consumption impact of mandating the inclusion of furnaces during testing and stated the importance of such a mandate is evidenced via the efficiency level differences between equipment with electric resistance heating or no heating, and with all other types of heating, as set forth in Table 3 to 10 CFR 431.97 titled ''Updates to the Minimum Cooling Efficiency Standards for Air Conditioning and Heating Equipment.'' (CA IOUs, No. 31, p. 2)

ASAP and NYSERDA urged DOE to remove furnaces from the list of specified excluded components and expressed concerns with DOE's proposal. (ASAP and NYSERDA, No. 32, p. 1) Specifically, ASAP and NYSERDA asserted that classifying a furnace a specified excluded component will permit testing that generates ratings that are not representative of the typical energy use of many DX–DOASes, and that the pressure drop of the furnace will not be accounted for. They also noted that for CUAC/HPs, DOE's energy conservation standards account for the impact of the presence of a gas furnace by including different equipment classes for units with and without furnaces. *Id.*

Similarly, NEEA recommended DOE remove furnaces as an excluded component and align with the CUAC/HP requirements for testing with furnaces installed. (NEEA, No. 35, p. 5) NEEA also suggested that DOE consider test procedures that reflect whole energy use, instead of having separate test procedures and metrics for furnaces and DX–DOASes, so that all features that impact energy use are accounted for. Specifically, NEEA stated that although the presence of the furnace may not have a large impact on the moisture removal (ISMRE) rating, DOE's approach to continue testing heating and cooling systems in HVAC systems completely separately may mean that the rating is not accounting for all features that impact energy use (both

[37] The ''Illustration of Specified Components Requirements'' document can be found at *www.regulations.gov/docket/EERE-2017-BT-TP-0018.*

that could save energy, or that increase energy use). *Id.*

DOE agrees that furnaces impose a pressure drop that may be greater than that of electric resistance heaters that may be used in DX–DOASes to provide reheat or heat in applications where furnaces are not utilized. DOE also recognizes that there may be an energy use impact associated with the greater airside pressure drop of a furnace as compared to an electric resistance heating element.

Neither the ISMRE levels specified in ASHRAE 90.1–2016 for DX–DOASes, nor the ISMRE2 levels proposed in the February 2022 ECS NOPR, take into consideration the additional energy use associated with furnace pressure drop. 87 FR 5560, 5564. DOE notes, however, that ASHRAE 90.1–2019 does not include separate equipment classes for DX–DOASes with and without furnaces. Therefore, the approach adopted in this final rule is consistent with the equipment class structure of ASHRAE 90.1–2019. DOE encourages stakeholders to consider whether to require DX–DOASes with furnaces to be tested with the furnace installed and whether to establish separate classes with different ISMRE2 levels for such equipment during the next revision of AHRI 920 and the next update of ASHRAE 90.1.

The amendments adopted in this final rule provide that representations, including those for certification of compliance, be based on individual models within the basic model that do not have a furnace installed, assuming such representation is consistent with the requirements established in this final rule, as discussed in III.F.2.d of this document.

(2) Coated Coils

As previously mentioned, in the December 2021 SNOPR DOE proposed to not include coated coils in the specific components list specified in 10 CFR 429.43 because DOE tentatively concluded that the presence of coated coils does not result in a significant impact to performance of DX–DOASes, and therefore, that models with coated coils should be rated based on performance of models with coated coils present. 86 FR 72874, 72880.

AHRI and MIAQ commented that coil coatings should remain an optional system feature. (AHRI, No. 34, p. 4; MIAQ, No. 29, p. 4) They stated that if coil coatings remain an optional feature, this would be consistent with the basic model structure of CUAC/HPs rated using AHRI 340/360–2019. They also stated that they support the flexibility to optionally include coated coils in a basic model or to create a unique basic model, depending on the impact on performance, and that each coating is different, and some do impact performance. *Id.* Similarly, Carrier did not support removing coated coils from the list of components that are exempted from testing. (Carrier, No. 30, p. 3) Carrier stated that alignment with AHRI 920–2020 by including the coated coil testing exemption can help streamline manufacturer certification and DOE enforcement of DX–DOAS energy conversation standards. *Id*

DOE notes that AHRI and MIAQ's comment asserting that some coated coils do impact energy use suggests that there are other implementations of coated coils that do not impact energy consumption as measured by the adopted test procedure; *i.e.,* the implementation of coated coils does not necessarily or inherently impact energy use. AHRI has not provided data indicating the range of impact for those coatings that do impact energy use, nor how other characteristics of the coatings such as durability and cost correlate with energy use impact. Absent such data, DOE is unable to determine the specific range of impact on energy use made by coated coils. Nevertheless, given that comments suggest that certain implementations of coated coils do not impact energy use, DOE has determined that for those DX–DOASes for which coated coils do impact energy use, representations should include that impact to provide full disclosure for commercial customers. As such, DOE is not incorporating coated coils into DOE's provisions specified in 10 CFR 429.43(a)(3) allowing for the exclusion of specified components when determining represented values, as discussed in section III.F.2 of this document.

e. Enforcement Provisions of 10 CFR 429.134

As proposed, DOE sought to address DX–DOASes that include the specified excluded components both in the requirements for representation (*i.e.,* 10 CFR 429.43) and as part of the equipment specific enforcement provisions for assessing compliance (*i.e.,* 10 CFR 429.143). 86 FR 72874, 72884–72887.

Instruction on which units to test for the purpose of representations are addressed in 10 CFR 429.43. DOE has determined that including parallel enforcement provisions in 10 CFR 429.143 would be redundant and potentially cause confusion because DOE would select for enforcement only those individual models that are the basis for making basic model representations as specified in 10 CFR 429.43. Therefore, in this final rule DOE is providing the requirements for making representations of DX–DOAS that include the specified components in 10 CFR 429.43, and is not including parallel direction in the enforcement provisions of 10 CFR 429.134 established in this final rule. However, DOE is finalizing the provision that allows enforcement testing of alternative individual models with specific components, if DOE cannot obtain for test the individual models without the components that are the basis of representation.

f. Testing Specially-Built Units That Are Not Distributed in Commerce

In the December 2021 SNOPR, DOE noted that Section F2.4 of AHRI 920–2020 includes a list of features that are optional for testing, and that this section further specifies the following general provisions regarding testing of units with specified components:

- If an otherwise identical model (within the same basic model) without the feature is distributed in commerce, test the otherwise identical model
- If an otherwise identical model (within the same basic model) without the feature is not distributed in commerce, conduct tests with the feature present but configured and de-activated so as to minimize (partially or totally) the impact on the results of the test (as determined per the provisions in section D2). Alternatively, the manufacturer may indicate in the supplemental testing instructions that the test shall be conducted using a specially built otherwise identical unit that is not distributed in commerce and does not have the feature.

86 FR 72874, 72879.

As mentioned in the December 2021 SNOPR, DOE tentatively determined that testing an otherwise identical unit that is not distributed in commerce and does not have the component (*i.e.,* a ''specially built'' unit) would not provide ratings representative of equipment distributed in commerce and proposed not to include this option for testing specially built units in its certification and enforcement provisions. *Id.*

Multiple stakeholders supported DOE's proposal to exclude the option to test specially built units that are not distributed in commerce. (CA IOUs, No. 31, p. 2; Carrier, No. 30, p. 2; ASAP and NYSERDA, No. 32, p. 1; NEEA, No. 35, p. 5) Specifically, the CA IOUs, NEEA, as well as ASAP and NYSERDA noted that testing specially built units would provide ratings not representative of equipment distributed in commerce.

(NEEA, No. 35, p. 5; CA IOUs, No. 31, p. 2; ASAP and NYSERDA, No. 32, p. 1) The CA IOUs additionally noted that it could yield test results that are not representative of an average use cycle. (CA IOUs, No. 31, p. 2)

Based on DOE's tentative determination in the December 2021 SNOPR that testing specially built units would not provide ratings representative of equipment distributed in commerce and based on stakeholder comments, in this final rule, DOE is not adopting the option to test specially built units in its certification and enforcement provisions.

G. Determination of Represented Values

In addition to the issues related to representations discussed in the prior section, DOE's proposals addressed a number of additional issues specific to determination of represented values. These issues are discussed in the following paragraphs.

1. Basic Model

In the July 2021 NOPR, DOE proposed a definition for a DX–DOAS basic model derived from the basic model definition for other commercial packaged air conditioning and heating equipment set forth at 10 CFR 431.92, and requested comment on the proposed definition. 86 FR 36018, 36044. Specifically, DOE proposed that in 10 CFR 431.92, a basic model for a DX–DOAS would mean all units manufactured by one manufacturer within a single equipment class; with the same or comparably performing compressor(s), heat exchangers, ventilation energy recovery system(s) (if present), and air moving system(s), and with a common ''nominal'' moisture removal capacity. *Id.*

AHRI recommended that the definition be amended consistent with the definition in AHRI 920–2020 appendix F, which specifies that rated ''nominal'' moisture removal capacity is determined at condition A of AHRI 920–2020. AHRI also recommended that the term ''nominal'' be defined consistent with AHRI 920–2020, as ''products with the same advertised MRC'' so that products are grouped correctly for regulatory purposes. (AHRI, No. 22, p. 8)

MIAQ supported defining these terms as defined in AHRI 920–2020. (MIAQ, No. 19, p. 4) Carrier supported DOE's proposed definition of basic model for DX–DOAS units. (Carrier, No. 20, p. 3)

The basic model definition for small, large, and very large air-cooled or water-cooled commercial package air conditioning and heating equipment means all units manufactured by one manufacturer within a single equipment class, having the same or comparably performing compressor(s), heat exchangers, and air moving system(s) that have a common ''nominal'' cooling capacity. 10 CFR 431.92. DOE also uses similar terminology for the basic model definition of computer room air conditioners, variable refrigerant flow systems, and small, large, and very large water source heat pumps. *Id.* DOE is unaware of any issues in defining this equipment using the term ''nominal'' without reference to conditions. As such, DOE determines that changes to the definition of basic model as it relates DX–DOAS and as proposed in the July 2021 NOPR are not warranted. Therefore, DOE is adopting the DX–DOAS basic model definition presented in the July 2021 NOPR (*i.e.,* that for DX–DOASes, basic model means all units manufactured by one manufacturer within a single equipment class; with the same or comparably performing compressor(s), heat exchangers, ventilation energy recovery system(s) (if present), and air moving system(s), and with a common ''nominal'' moisture removal capacity).

2. Sampling Plan Requirements

As previously mentioned, DOE is defining DX–DOAS as a category of unitary DOAS and is defining unitary DOAS as a category of small, large, or very large commercial package air conditioning and heating equipment. In the July 2021 NOPR, DOE proposed to apply the same sampling requirements to DX–DOASes as the sampling requirements applicable to other commercial package air conditioning and heating equipment under 10 CFR 429.43. 86 FR 36018, 36044.

Carrier and the CA IOUs supported DOE's proposal in the July 2021 NOPR. (Carrier, No. 20, p. 3; CA IOUs, No. 25, p. 3) The CA IOUs stated that manufacturers of other types of small, large, or very large commercial package air conditioning and heating equipment are able to comply with the sampling requirements set forth by DOE.

AHRI stated that while DOE's proposal for DX–DOAS sampling requirements appears appropriate, there is a lack of test data using AHRI 920–2020 to support the proposal and stated that current testing technology may not support this level of precision. AHRI recommended that DOE issue an SNOPR after ASHARE Standard 90.1–2022 publishes to allow manufacturers to test and rate equipment for an informed determination of the sampling plan requirements. (AHRI, No. 22, pp. 8–9) MIAQ recommended requiring two systems with 90percent confidence level for the sampling plan of DX–DOASes. (MIAQ, No. 19, p. 4)

DOE notes that the confidence level currently used for small, large, or very large commercial package air conditioning and heating equipment is 95 percent, which is higher than the 90 percent suggested by MIAQ. 10 CFR 429.43(A)(2). MIAQ did not provide data supporting a 90 percent confidence level, and DOE does currently have any data to support lowering the confidence level from 95 percent to 90 percent.

Although, DOE agrees with AHRI that there is not a significant amount of DX–DOAS performance data available that is based on testing to AHRI 920–2020, DOE has determined that the test procedure DOE is adopting does not assess performance in an inherently different manner than the test procedures for other small, large, or very large commercial package air conditioning and heating equipment. That is, performance for both DOAS and other categories of such equipment are measured using the measurement techniques generally described in ANSI/ASHRAE 37–2009. Specifically, capacity is determined by measurement of airflow using air flow nozzles, and measurement of air entering and leaving conditions using temperature sensors and devices to measure moisture content of the air, typically psychrometers. The accuracy requirements for these measurements are consistent for the two equipment categories. Further, the equipment components and manufacturing techniques used to produce the equipment are generally the same. Thus, the two key factors affecting uncertainty of measurement are consistent with each other for the two equipment categories, which suggests that using the same sample plan statistics, such as a 95 percent confidence interval, is appropriate. For the reasons discussed and presented in the July 2021 NOPR, DOE is adopting in 10 CFR 429.43, the sampling plan requirements proposed in the July 2021 NOPR, which are consistent with the sampling requirements for small, large, or very large commercial package air conditioning and heating equipment.

3. Multiple Refrigerants

In the July 2021 NOPR, DOE noted that some commercial package air conditioning and heating equipment may be sold with more than one refrigerant option, and that DOE has identified at least one commercial package air conditioning and heating equipment manufacturer that provides two refrigerant options under the same model number. 86 FR 36018, 36044.

DOE noted that the use of a refrigerant that requires different hardware (such as R–407C as compared to R–410A) would represent a different basic model, and according to the current CFR, separate representations of energy efficiency are required for each basic model. DOE also noted that some refrigerants (such as R–422D and R–427A) would not require different hardware, and a manufacturer may consider them to be the same basic model.

In the July 2021 NOPR, DOE requested comment on a proposal to add a new paragraph at 10 CFR 429.43(a)(3) specifying that a manufacturer must determine the represented values for that basic model based on the refrigerant(s)—among all refrigerants listed on the unit's nameplate—that result in the lowest ISMRE2 and ISCOP2 efficiencies, respectively. For example, the dehumidification performance metric ISMRE2 must be based on the refrigerant yielding the lowest ISMRE2, and the heating performance metric ISCOP2 (if the unit is a heat pump DX–DOAS) must be based on the refrigerant yielding the lowest ISCOP2. *Id.*

AHRI, the Joint Advocates, the CA IOUs, Carrier, and MIAQ stated that they support DOE's proposal in the July 2021 NOPR. (AHRI, No. 22, p. 9; Joint Advocates, No. 21, p. 2; CA IOUs, No. 25, p. 5; Carrier, No. 20, p. 4; MIAQ, No. 19, p. 4; MIAQ, No. 19, p. 6)

As discussed in section III.F.2 of this final rule, DOE is clarifying in 10 CFR 429.43(a)(3)(i)(A) that representations for a DX–DOAS basic model must be based on the least efficient individual model(s) distributed in commerce within the basic model (with the exception specified in 10 CFR 429.43(a)(3)(i)(A) for certain individual models with the components listed in Table 1 of 10 CFR 429.43; this list does not include different refrigerants). Upon further consideration, DOE has determined that the proposal in the July 2021 NOPR regarding multiple refrigerants is already included substantively in the provision adopted at 10 CFR 429.43(a)(3)(i)(A), and that the refrigerant-specific provisions proposed in the July 2021 NOPR at 10 CFR 429.43(a)(3) would be redundant. As such, in this final rule, DOE is not adopting the refrigerant specific language proposed in the July 2021 SNOPR.

MIAQ noted that the industry has petitioned the EPA to implement a January 1, 2025 compliance date for the transition to refrigerants with a global warming potential less than 750 associated with the AIM Act. MIAQ requested that DOE's compliance date for energy conservation standards be no sooner than this date due to the complexity and expense of the refrigerant transition. (MIAQ, No. 19, p. 6) MIAQ stated that a compliance date sooner than January 1, 2025 would result in the industry not having sufficient time to test and certify product portfolios with current refrigerants prior to beginning this effort a second time with a next-generation refrigerant. *Id.* MIAQ also reiterated this in their response to the December 2021 SNOPR, adding that DOAS equipment is complex, expensive, and requires substantial time to test and certify per required test procedures, and that setup time alone can take as much one week per basic model. (MIAQ, No. 29, p. 4)

As previously mentioned, DOE has separately initiated a rulemaking to analyze DX–DOAS energy conservation standards and has most recently published the February 2022 ECS NOPR. DOE will determine the appropriate compliance date should DOE adopt DX–DOAS standards, in that ongoing rulemaking.

4. Alternative Energy-Efficiency Determination Methods

By establishing DX–DOASes as a subset of unitary-DOASes, and by establishing unitary-DOASes as a category of small, large, or very large commercial package air conditioning and heating equipment, the provisions of 10 CFR 429.43 authorizing use of an alternative energy-efficiency determination method (''AEDM'') for commercial HVAC equipment would apply to DX–DOASes. In the July 2021 NOPR, DOE proposed to allow DX–DOAS manufacturers to use AEDMs for determining the ISMRE2 and ISCOP2 (if applicable) in accordance with 10 CFR 429.70. 86 FR 36018, 36044. DOE proposed to create four validation classes of DX–DOASes within the *Validation classes* table at 10 CFR 429.70(c)(2)(iv): air-cooled/air-source and water-cooled/water-source, each with and without VERS (*i.e.,* 8 validation classes in total). DOE also proposed to require testing of two basic models to validate the AEDMs for each validation class. Finally, DOE proposed to specify in the table at 10 CFR 429.70(c)(5)(vi) a tolerance of 10-percent for DX–DOAS verification tests for ISMRE2 and ISCOP2 when comparing test results with certified ratings. *Id.* These proposals are consistent with the treatment of other categories of commercial package air-conditioning and heating equipment.

Carrier supported the proposed AEDM requirements and a 10-percent tolerance for comparison of test results and rated values. (Carrier, No. 20, p. 4) AHRI noted that heat pump units may be considered as separate basic model groups from the cooling-only units, and therefore the number of tests required for AEDM validation would be 16 (*i.e.,* double the count from the July 2021 NOPR). (AHRI, No. 22, p. 9) AHRI also recommended that when manufacturers use Option 2 on units with the same cooling section design, separate AEDMs should not be required for products with and without VERS, stating that this would be technically consistent with the test procedure and would reduce the testing burden on manufacturers. Additionally, AHRI stated that the appropriateness of the 10-percent tolerance for AEDM verification could not be confirmed without sufficient test data collection, which has not yet occurred, and that this would amount to further reason for DOE to delay its test procedure rulemaking until AHRI 920–2020 is adopted by ASHRAE 90.1. *Id.* MIAQ similarly expressed concern if a 10-percent tolerance is appropriate. (MIAQ, No. 19, p. 5)

DOE notes that the validation classes for other small, large, and very large commercial package air conditioning and heating equipment do not separate heat pumps and air conditioners into separate validation classes. DOE has no reason to suggest that separating these into separate validation classes for DX–DOASes would be more appropriate, or result in a more representative AEDM. Absent any evidence to support establishing another set of validation classes for DX–DOAS heat pumps, DOE is not establishing a separate set of validation classes for this equipment.

Furthermore, DOE has determined that establishing a single validation class for units with and without VERS is not appropriate. The range of air conditions entering a DX–DOAS without VERS is much broader than the range of air conditions entering a unit with VERS, hence it is expected that validation of an AEDM by testing two models with VERS would be a less rigorous validation than testing two models without VERS. Hence, although DOE has determined that a separate validation class for units with VERS is necessary for this reason, the AEDM requirements as finalized in this final rule allow manufacturers to use an AEDM developed for models without VERS to develop representations for models with VERS.

5. Rounding

In the July 2021 NOPR, DOE requested comment on its proposal to adopt in section 2.2.1(c)(iv) of appendix B the rounding requirements for DX–DOAS performance metrics specified in

Sections 6.1.2.1 through 6.1.2.8 of AHRI 920–2020. 86 FR 36018, 36045. This included rounding requirements for the following: COP, electrical power input, ISCOP2, ISMRE2, MRC, MRE, total heating capacity, supply air temperature, and due point temperature.

In response to the July 2021 NOPR, DOE received comment from AHRI, Carrier, and MIAQ supporting DOE's proposal to adopt the rounding requirements in AHRI 920–2020. (AHRI, No. 22, p. 10; Carrier, No. 20, p. 4; MIAQ, No. 19, p. 5) For the reasons discussed in the July 2021 NOPR, DOE is adopting the rounding requirements specified in Sections 6.1.2.1 through 6.1.2.8 of AHRI 920–2020 in section 2.2.1(c)(iv) of the proposed appendix B.

H. Effective and Compliance Dates

The effective date for the adopted test procedure will be 30 days after publication of this final rule in the **Federal Register**. EPCA prescribes that all representations of energy efficiency and energy use, including those made on marketing materials and product labels, must be made in accordance with an amended test procedure, beginning 360 days after publication of the final rule in the **Federal Register**. (42 U.S.C. 6314(d)(1))

I. Test Procedure Costs

In the July 2021 NOPR, DOE tentatively determined that DOE's proposed test procedure is consistent with current industry practice, and, therefore, manufacturers would not be expected to incur any additional costs. 86 FR 36018, 36046–36047. Importantly, DOE noted that the adoption of the test procedure proposed in the July 2021 NOPR would not require manufacturers to certify ratings to DOE, and that DOE would address certification as part of a separate rulemaking. *Id.*

DOE also tentatively determined in the July 2021 NOPR that the extent to which DOE is making modifications to the industry consensus test procedure (AHRI 920–2020), DOE is consistent with the industry consensus standard; and that absent such modifications, the industry test procedure would not meet the requirements in 42 U.S.C. 6314(a)(2) and (3) related to representative use and test burden. (42 U.S.C. 6314(a)(4)(B) and (C)). *Id.* Additionally, DOE determined that the modifications to AHRI 920–2020 proposed in the July 2021 NOPR would be unlikely to significantly increase burden, given that DOE is referencing the prevailing industry test procedure. Therefore, presuming widespread usage of that test standard, DOE determined that its adoption as part of the Federal test procedure would be expected to result in little additional cost, even with the minor modifications proposed. DOE also determined that the test procedure would not require manufacturers to redesign any of the covered equipment, would not require changes to how the equipment is manufactured, and would not impact the utility of the equipment. *Id.*

In the July 2021 NOPR, DOE requested comment on its understanding of the impact the test procedure proposals in the NOPR, specifically on DOE's conclusion that manufacturers would not incur any additional costs. 86 FR 36018, 36047.

AHRI, Carrier, and MIAQ agreed that manufacturers would not incur any additional costs due to the proposed DOE test procedure compared to current industry practices. (AHRI, No. 22, p. 10; Carrier, No. 20, p. 4; MIAQ, No. 19, p. 5) Carrier requested that DOE consider laboratory infrastructure capital costs when evaluating testing costs, stating that there is uncertainty as to whether test facilities can accommodate DX–DOASes with capacities as high as 324 lb/h. Carrier expressed concerns about testing units with VERS per the Option 1 methodology (which requires an additional psychrometric chamber) and stated that even Option 2 introduces additional complexity. Carrier recommended that, if there is a lack of testing capability for units with VERS, DOE should revise the definition of a basic model to not include VERS so that the performance of models with VERS can be represented using AEDMs. (Carrier, No. 20, p. 5)

The CA IOUs supported DOE permitting DX–DOASes with VERS to be tested under the Option 2 configuration for the time being in order to limit manufacturer test burden. The CA IOUs speculated that Option 1 may result in more accurate ratings. (CA IOUs, No. 25, p. 2) Additionally, in the August 2021 public meeting, AHRI noted that test laboratories have mostly overcome limitations that previously posed challenges to testing DX–DOASes according to AHRI 920. (AHRI, No. 18, p. 23)

Consistent with what DOE determined in the July 2021 NOPR, DOE has determined that by incorporating by reference the revised industry test standard, AHRI 920–2020, with certain modifications, the test procedure DOE is establishing (appendix B) is consistent with the industry standard and will not add undue industry test burden or incur any additional tests costs.

IV. Procedural Issues and Regulatory Review

A. Review Under Executive Order 12866

Executive Order (''E.O.'') 12866, ''Regulatory Planning and Review,'' as supplemented and reaffirmed by E.O. 13563, ''Improving Regulation and Regulatory Review, 76 FR 3821 (Jan. 21, 2011), requires agencies, to the extent permitted by law, to (1) propose or adopt a regulation only upon a reasoned determination that its benefits justify its costs (recognizing that some benefits and costs are difficult to quantify); (2) tailor regulations to impose the least burden on society, consistent with obtaining regulatory objectives, taking into account, among other things, and to the extent practicable, the costs of cumulative regulations; (3) select, in choosing among alternative regulatory approaches, those approaches that maximize net benefits (including potential economic, environmental, public health and safety, and other advantages; distributive impacts; and equity); (4) to the extent feasible, specify performance objectives, rather than specifying the behavior or manner of compliance that regulated entities must adopt; and (5) identify and assess available alternatives to direct regulation, including providing economic incentives to encourage the desired behavior, such as user fees or marketable permits, or providing information upon which choices can be made by the public. DOE emphasizes as well that E.O. 13563 requires agencies to use the best available techniques to quantify anticipated present and future benefits and costs as accurately as possible. In its guidance, the Office of Information and Regulatory Affairs (''OIRA'') in the Office of Management and Budget (''OMB'') has emphasized that such techniques may include identifying changing future compliance costs that might result from technological innovation or anticipated behavioral changes. For the reasons stated in the preamble, this proposed/final regulatory action is consistent with these principles.

Section 6(a) of E.O. 12866 also requires agencies to submit ''significant regulatory actions'' to OIRA for review. OIRA has determined that this final regulatory action does not constitute a ''significant regulatory action'' under section 3(f) of E.O. 12866. Accordingly, this action was not submitted to OIRA for review under E.O. 12866.

B. Review Under the Regulatory Flexibility Act

The Regulatory Flexibility Act (5 U.S.C. 601 *et seq.*) requires preparation

of a final regulatory flexibility analysis (FRFA) for any final rule where the agency was first required by law to publish a proposed rule for public comment, unless the agency certifies that the rule, if promulgated, will not have a significant economic impact on a substantial number of small entities. As required by Executive Order 13272, ''Proper Consideration of Small Entities in Agency Rulemaking,'' 67 FR 53461 (August 16, 2002), DOE published procedures and policies on February 19, 2003 to ensure that the potential impacts of its rules on small entities are properly considered during the DOE rulemaking process. 68 FR 7990. DOE has made its procedures and policies available on the Office of the General Counsel's website: *energy.gov/gc/office-general-counsel.*

DOE conducted an initial regulatory flexibility analysis (''IRFA'') as part of the July 7, 2021 NOPR, and determined that there are three domestic small businesses that manufacture DX–DOASes. 86 FR 36050. Based on stakeholder feedback, DOE revised its small business count to one domestic small business in the December SNOPR. DOE still tentatively concludes that the proposed test procedure in that NOPR would not present a significant burden to small manufacturers. 86 FR 72280. DOE reviewed this final rule under the provisions of the Regulatory Flexibility Act and the policies and procedures published on February 19, 2003. The following sections detail DOE's FRFA for this test procedure rulemaking.

1. Need for, and Objective of, the Rule

The Energy Policy and Conservation Act, as amended (''EPCA''),[38] authorizes DOE to regulate the energy efficiency of a number of consumer products and certain industrial equipment. (42 U.S.C. 6291–6317) Title III, Part C [39] of EPCA, Public Law 94–163 (42 U.S.C. 6311–6317, as codified), added by Public Law 95–619, Title IV, section 441(a), established the Energy Conservation Program for Certain Industrial Equipment, which sets forth a variety of provisions designed to improve energy efficiency. This covered equipment includes small, large, and very large commercial package air conditioning and heating equipment. (42 U.S.C. 6311(1)(B)–(D))

DOE undertook this test procedure rulemaking to establish a DOE test procedure for DX–DOASes in response to updates to the relevant industry consensus standard, ASHRAE 90.1, Energy Standard for Buildings Except Low-Rise Residential Buildings, which, with its 2016 publication, both added efficiency standards and specified a test procedure for this equipment (*i.e.,* ANSI/AHRI 920–2015). As noted, DOE is adopting the updated version of that test procedure, AHRI 920–2020, with modifications, to ensure that the Federal test procedure for DX–DOASes meet the representativeness and burden requirements of 42 U.S.C. 6314(a)(2) and (3).

2. Significant Issues Raised in Response to the Initial Regulatory Flexibility Analysis

In the July 2021 NOPR, DOE requested comment on its proposal of the testing costs and timing of testing costs described in the IRFA. 86 FR 36018, 36050. In response to the July 2021 NOPR, AHRI expressed concern that having different metrics cited in ASHRAE Standard 90.1 and in the DOE's energy conservation standards would introduce additional costs of compliance from disharmonized requirements, and that these costs would be felt more acutely by small manufacturers. AHRI requested DOE delay its rulemaking until after ASHRAE 90.1 is updated to reflect AHRI 920–2020 as the new test procedure and include adjusted efficiency standards. (AHRI, No. 22, p. 11). Furthermore, MIAQ asserted that DOE does not have the authority to adopt AHRI 920–2020 as the national test procedure. MIAQ requested that DOE wait for AHRI 920–2020 and to be adopted in ASHRAE Standard 90.1 and for energy conservation standard levels to be established using the new metrics before finalizing this test procedure rulemaking. (MIAQ, No. 19, p. 6)

The CA IOUs expressed that there would be little value in delaying the finalization of a test procedure for DX–DOASes because an industry test procedure has been established with broad stakeholder engagement. (CA IOUs, No. 25, p. 2) The CA IOUs supported DOE's proposal to incorporate AHRI 920–2020 by reference, along with slight modifications, and encouraged DOE to expeditiously finalize the test procedure for DX–DOAS. The CA IOUs stated that DOE was triggered to review the coverage of DX–DOAS equipment as a result of ASHRAE 90.1–2016 (and to adopt standards for DX–DOASes within 18 months of the inclusion of DX–DOAS standards in ASHRAE 90.1–2016). (CA IOUs, No. 25, p. 1–2) The CA IOUs also stated that AHRI 920–2020 is the industry consensus test procedure for DX–DOAS equipment, and that it was developed through a collaborative process with a range of stakeholders. (CA IOUs, No. 25, p. 1)

As discussed in section III.C of this DX–DOAS test procedure final rule, DOE disagrees with assertions by commenters that it lacks the authority to adopt AHRI 920–2020. As discussed, ASHRAE 90.1–2016 for the first time included provisions specific to DX–DOASes. This triggered DOE's review of these new provisions to establish initial Federal energy conservation standards and test procedures for DX–DOASes. With respect to small, large, and very large commercial package air conditioning and heating equipment, EPCA directs that the test procedures shall be those generally accepted industry testing procedures or rating procedures developed or recognized by AHRI or by ASHRAE, as referenced in ASHRAE Standard 90.1. (42 U.S.C. 6314(a)(4)(A)). In this instance, the industry test procedure referenced in Standard 90.1 is AHRI 920–2015.

However, contrary to the commenters' suggestions, that is not the limit of DOE's considerations under EPCA for purposes of establishing the initial Federal test procedure for DX–DOASes. DOE must also ensure that test procedures established under 42 U.S.C. 6314 are reasonably designed to produce test results which reflect energy efficiency, energy use, and estimated operating costs during a representative average use cycle and are not unduly burdensome to conduct. (42 U.S.C. 6314(a)(2)) When first establishing a Federal test procedure for small, large, and very large commercial package air conditioning and heating equipment, nothing in 42 U.S.C. 6314 precludes DOE from deviating from the industry test procedure referenced in Standard 90.1 where DOE determines said industry test procedure does not meet the representativeness and burden requirements in 42 U.S.C. 6314(a)(2) and another test procedure is better able to produce results representative of an average use cycle and is not unduly burdensome to conduct.

In this instance, the industry test procedure referenced in Standard 90.1, AHRI 920–2015, has been superseded in the intervening years since DOE was first triggered to review the DX–DOAS provisions of Standard 90.1–2016. DOE acknowledges that DOE has previously stated that it will only consider an update to ASHRAE Standard 90.1 that modifies the referenced industry test procedure to be a trigger under the statute, as opposed to an update of just the industry test procedure itself. (*See*

[38] All references to EPCA in this document refer to the statute as amended through the Infrastructure Investment and Jobs Act, Public Law 117–58 (Nov. 15, 2021).

[39] For editorial reasons, upon codification in the U.S. Code, Part C was redesignated Part A–1.

e.g., 86 FR 35668, 35676 (July 7, 2021)). But that does not preclude DOE from considering the updated version of the industry test procedure (*i.e.,* AHRI 920–2020) when first establishing the DOE Federal test procedures where the referenced test procedure (AHRI 920–2015) does not meet the requirements of 42 U.S.C. 6314(a)(2).

For the reasons discussed in section III.C of this final rule, DOE has determined that AHRI 920–2015 is not reasonably designed to produce test results which reflect energy efficiency of DX–DOASes during a representative average use cycle and some components of AHRI 920–2015 are unnecessarily burdensome. AHRI 920–2020 resolves these flaws in AHRI 920–2015 and is better able to produce representative results with less burden. Accordingly, DOE has adopted AHRI 920–2020, with modifications, in this final rule.

Carrier requested that DOE consider laboratory infrastructure capital costs when evaluating testing costs, stating that there is uncertainty as to whether test facilities can accommodate DX–DOASes with capacities as high as 324 lb/h. Carrier expressed concerns about testing units with VERS per the Option 1 methodology (which requires an additional psychrometric chamber) and stated that even Option 2 introduces additional complexity. Carrier recommended that, if there is a lack of testing capability for units with VERS, DOE should revise the definition of a basic model to not include VERS so that the performance of models with VERS can be represented using AEDMs. (Carrier, No. 20, p. 5)

The CA IOUs supported DOE permitting DX–DOASes with VERS to be tested under the Option 2 configuration for the time being in order to limit manufacturer test burden. The CA IOUs speculated that Option 1 may result in more accurate ratings. (CA IOUs, No. 25, p. 2) Additionally, in the August 2021 public meeting, AHRI noted that test laboratories have mostly overcome limitations that previously posed challenges to testing DX–DOASes according to AHRI 920. (AHRI, No. 18, p. 23)

AHRI, Carrier, and MIAQ agreed with DOE's assessment that manufacturers would not incur any additional costs due to the proposed DOE test procedure compared to current industry practices. (AHRI, No. 22, p. 10; Carrier, No. 20, p. 4; MIAQ, No. 19, p. 5)

As discussed in section III.I of the DX–DOAS test procedure final rule, DOE has determined that by incorporating by reference the revised industry test standard, AHRI 920–2020, with certain modifications, the test procedure DOE is establishing (appendix B) is consistent with the industry standard. Therefore, DOE has concluded that the DX–DOAS test procedure outlined in this final rule is consistent with the industry standard and that it will not add undue industry test burden or cause manufactures to incur any additional tests costs, including small businesses.

3. Description and Estimate of the Number of Small Entities Affected

For manufacturers of small, large, and very large air-conditioning and heating equipment (including DX–DOASes), commercial warm-air furnaces, and commercial water heaters, the Small Business Administration (''SBA'') has set a size threshold which defines those entities classified as ''small businesses''. DOE used the SBA's small business size standards to determine whether any small entities would be subject to the requirements of this rule. *See* 13 CFR part 121. The equipment covered by this final rule are classified under North American Industry Classification System (''NAICS'') code 333415,[40] ''Air-Conditioning and Warm Air Heating Equipment and Commercial and Industrial Refrigeration Equipment Manufacturing.'' In 13 CFR 121.201, the SBA sets a threshold of 1,250 employees or fewer for an entity to be considered as a small business for this category.

In reviewing the DX–DOAS market, DOE used company websites, marketing research tools, product catalogues, and other public information to identify companies that manufacture DX–DOASes. DOE screened out companies that do not meet the definition of ''small business'' or are foreign-owned and operated. DOE used subscription-based business information tools to determine headcount, revenue, and geographic presence of the small businesses.

As noted in the December 2021 SNOPR, DOE initially identified 16 manufacturers of DX–DOASes, of which three met the definition of a domestic small businesses. Based on stakeholder feedback, DOE revised its count to 12 manufacturers of DX–DOASes, of which one was identified as a domestic small business. 86 FR 72874, 72880.

Out of these 12 OEMs, DOE determined that there is one domestic small manufacturer. DOE understands the annual revenue of the small manufacturer to be approximately $66 million.

[40] The business size standards are listed by NAICS code and industry description and are available at: *www.sba.gov/document/support--table-size-standards* (Last Accessed July 29th, 2021).

4. Description of Compliance Requirements

In this final rule, DOE establishes a definition for unitary DOAS as a category of commercial package air conditioning and heating equipment and adopts a new test procedure for DX–DOASes, a subset of unitary DOASes, consistent with the current industry consensus test standard. This test procedure applies to all DX–DOASes for which ASHRAE 90.1–2019 specifies standards, with the exception of ground-water-source DX–DOASes. More specifically, DOE is updating 10 CFR 431.96, ''Uniform test method for the measurement of energy efficiency of commercial air conditioners and heat pumps,'' to adopt a new test procedure for DX–DOASes as follows: (1) incorporate by reference AHRI 920–2020, and the relevant industry standards referenced therein; (2) establish the scope of coverage for the DX–DOAS test procedure; (3) add definitions for unitary DOASes and DX–DOASes, as well as additional terminology required by the test procedure; (4) adopt ISMRE2 and ISCOP2 as measured according to the most recent applicable industry standard, as energy efficiency descriptors for dehumidification and heating mode, respectively; (5) provide instructions for testing DX–DOASes with certain specific components; and (6) establish representation requirements. DOE is also adding a new appendix B to subpart F of part 431, titled ''Uniform test method for measuring the energy consumption of dehumidifying direct expansion-dedicated outdoor air systems,'' (''appendix B'') that includes the new test procedure requirements for DX–DOASes. In conjunction, DOE is amending Table 1 in 10 CFR 431.96 to specify the newly added appendix B as the applicable test procedure for testing DX–DOASes. DOE has determined that the adopted test procedure will not be unduly burdensome to conduct.

DOE also tentatively determined in the July 2021 NOPR that the extent to which DOE is making modifications to the industry consensus test procedure (AHRI 920–2020), DOE is consistent with the industry consensus standard; and that the modifications are necessary, because absent such modifications, the industry test procedure would not meet the requirements in 42 U.S.C. 6314(a)(2) and (3) related to representative use and test burden. 86 FR 36018, 36046–36047. Additionally, DOE determined that the modifications to AHRI 920–2020 proposed in the July 2021 NOPR would

be unlikely to significantly increase burden, given that DOE is referencing the prevailing industry test procedure. Therefore, presuming widespread usage of that test standard, DOE determined that its adoption as part of the Federal test procedure would be expected to result in little additional cost, even with the minor modifications proposed. DOE also determined that the test procedure would not require manufacturers to redesign any of the covered equipment, would not require changes to how the equipment is manufactured, and would not impact the utility of the equipment. *Id.*

The testing of DX–DOASes as outlined in this final rule would not be required until 360 days after the issuance of this rule for representations made by manufacturers, or such time as DOE establishes DX–DOAS energy conservation standards. As such, the small manufacturer will have one year, at a minimum, to prepare for the testing detailed in this final rule should they not already be testing to AHRI 920–2020. Additionally, if the manufacturer is already testing to AHRI 920–2020, they would incur no additional costs as a result of this final rule.

DOE determined the cost to rate all models should the small manufacturer not already be testing to AHRI 920–2020. In its review of AHRI 920–2020, DOE determined the cost for third-party lab testing of basic models to range from $10,000 to $23,500 depending on validation class, equipment capacity, and equipment configuration. However, manufacturers are not required to perform laboratory testing on all basic models. Manufacturers may use alternative energy-efficiency determination methods (''AEDMs'') for determining the ISMRE2 and ISCOP2 (if applicable) in accordance with 10 CFR 429.70. An AEDM is a computer modeling or mathematical tool that predicts the performance of non-tested basic models. These computer modeling and mathematical tools, when properly developed, can provide a relatively straight-forward and reasonably accurate means to predict the energy usage or efficiency characteristics of a basic model of a given covered product or equipment and reduce the burden and cost associated with testing. Consistent with the July 2021 initial regulatory flexibility analysis, DOE initially estimated an average cost of approximately $200,000 per small manufacturer to certify, when making use of an AEDM. 86 FR 36018, 36049–36050. DOE estimates this to be less than 1percent of revenue for the small manufacturer. 86 FR 36018, 36049–36050.

5. Significant Alternatives Considered and Steps Taken To Minimize Significant Economic Impacts on Small Entities

DOE reduces burden on manufacturers, including small businesses, by allowing AEDMs in lieu of physical testing all basic models. The use of computer modeling is more time-efficient than physical testing. Without AEDMs, DOE estimates the conservative case to rate all basic models would exceed $6 million for the small manufacturer, as compared to the $200,000 per small manufacturer in this final rule analysis.

Additionally, DOE considered alternative test methods and modifications to the test procedure for DX–DOASes, and the Department has determined that there are no better alternatives than the modifications and test procedures proposed in this final rule, in terms of both meeting the agency's objectives and reducing burden. DOE examined relevant industry test standards, and the Department incorporated these standards in the proposed test procedures whenever appropriate to reduce test burden to manufacturers. Specifically, this final rule establishes a test procedure for DX–DOASes through incorporation by reference of AHRI 920–2020 with modifications that are not expected to increase test burden.

Additionally, individual manufacturers may petition for a waiver of the applicable test procedure. (*See* 10 CFR 431.401.) Also, Section 504 of the Department of Energy Organization Act, 42 U.S.C. 7194, provides authority for the Secretary to adjust a rule issued under EPCA in order to prevent ''special hardship, inequity, or unfair distribution of burdens'' that may be imposed on that manufacturer as a result of such rule. Manufacturers should refer to 10 CFR part 1003 for additional details.

C. Review Under the Paperwork Reduction Act of 1995

DOE's certification and compliance activities ensure accurate and comprehensive information about the energy and water use characteristics of covered products and covered equipment sold in the United States. Manufacturers of all covered products and covered equipment with applicable standards must submit a certification report before a basic model is distributed in commerce, annually thereafter, and if the basic model is redesigned in such a manner to increase the consumption or decrease the efficiency of the basic model such that the certified rating is no longer supported by the test data. Additionally, manufacturers must report when production of a basic model has ceased and is no longer offered for sale as part of the next annual certification report following such cessation. DOE requires the manufacturer of any covered product or covered equipment to establish, maintain, and retain the records of certification reports, of the underlying test data for all certification testing, and of any other testing conducted to satisfy the requirements of 10 CFR part 429, 10 CFR part 430, and/or 10 CFR part 431. Certification reports provide DOE and consumers with comprehensive, up-to date efficiency information and support effective enforcement.

DOE is not adopting certification or reporting requirements for DX–DOASes in this final rule. Certification of DX–DOAS would not be required until such time as DOE establishes DX–DOAS energy conservation standards and manufacturers are required to comply with those standards. DOE may consider proposals to establish certification requirements and reporting for DX–DOASes under a separate rulemaking regarding appliance and equipment certification. DOE will address changes to OMB Control Number 1910–1400 at that time, as necessary. Notwithstanding any other provision of the law, no person is required to respond to, nor shall any person be subject to a penalty for failure to comply with, a collection of information subject to the requirements of the PRA, unless that collection of information displays a currently valid OMB Control Number.

D. Review Under the National Environmental Policy Act of 1969

In this final rule, DOE establishes test procedure amendments that it expects will be used to develop and implement future energy conservation standards for DX–DOASes. DOE has determined that this rule falls into a class of actions that are categorically excluded from review under the National Environmental Policy Act of 1969 (42 U.S.C. 4321 *et seq.*) and DOE's implementing regulations at 10 CFR part 1021. Specifically, DOE has determined that adopting test procedures for measuring energy efficiency of consumer products and industrial equipment is consistent with activities identified in 10 CFR part 1021, appendix A to subpart D, A5 and A6. Accordingly, neither an environmental assessment nor an environmental impact statement is required.

E. Review Under Executive Order 13132

Executive Order 13132, ''Federalism,'' 64 FR 43255 (August 4, 1999), imposes certain requirements on agencies formulating and implementing policies or regulations that preempt State law or that have federalism implications. The Executive order requires agencies to examine the constitutional and statutory authority supporting any action that would limit the policymaking discretion of the States and to carefully assess the necessity for such actions. The Executive order also requires agencies to have an accountable process to ensure meaningful and timely input by State and local officials in the development of regulatory policies that have federalism implications. On March 14, 2000, DOE published a statement of policy describing the intergovernmental consultation process it will follow in the development of such regulations. 65 FR 13735. DOE examined this final rule and determined that it will not have a substantial direct effect on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government. EPCA governs and prescribes Federal preemption of State regulations as to energy conservation for the products that are the subject of this final rule. States can petition DOE for exemption from such preemption to the extent, and based on criteria, set forth in EPCA. (42 U.S.C. 6297(d)) No further action is required by Executive Order 13132.

F. Review Under Executive Order 12988

Regarding the review of existing regulations and the promulgation of new regulations, section 3(a) of Executive Order 12988, ''Civil Justice Reform,'' 61 FR 4729 (Feb. 7, 1996), imposes on Federal agencies the general duty to adhere to the following requirements: (1) eliminate drafting errors and ambiguity; (2) write regulations to minimize litigation; (3) provide a clear legal standard for affected conduct rather than a general standard; and (4) promote simplification and burden reduction. Section 3(b) of Executive Order 12988 specifically requires that executive agencies make every reasonable effort to ensure that the regulation (1) clearly specifies the preemptive effect, if any; (2) clearly specifies any effect on existing Federal law or regulation; (3) provides a clear legal standard for affected conduct while promoting simplification and burden reduction; (4) specifies the retroactive effect, if any; (5) adequately defines key terms; and (6) addresses other important issues affecting clarity and general draftsmanship under any guidelines issued by the Attorney General. Section 3(c) of Executive Order 12988 requires Executive agencies to review regulations in light of applicable standards in sections 3(a) and 3(b) to determine whether they are met or it is unreasonable to meet one or more of them. DOE has completed the required review and determined that, to the extent permitted by law, this final rule meets the relevant standards of Executive Order 12988.

G. Review Under the Unfunded Mandates Reform Act of 1995

Title II of the Unfunded Mandates Reform Act of 1995 (''UMRA'') requires each Federal agency to assess the effects of Federal regulatory actions on State, local, and Tribal governments and the private sector. Public Law 104–4, sec. 201 (codified at 2 U.S.C. 1531). For a regulatory action resulting in a rule that may cause the expenditure by State, local, and Tribal governments, in the aggregate, or by the private sector of $100 million or more in any one year (adjusted annually for inflation), section 202 of UMRA requires a Federal agency to publish a written statement that estimates the resulting costs, benefits, and other effects on the national economy. (2 U.S.C. 1532(a), (b)) The UMRA also requires a Federal agency to develop an effective process to permit timely input by elected officers of State, local, and Tribal governments on a proposed ''significant intergovernmental mandate,'' and requires an agency plan for giving notice and opportunity for timely input to potentially affected small governments before establishing any requirements that might significantly or uniquely affect small governments. On March 18, 1997, DOE published a statement of policy on its process for intergovernmental consultation under UMRA. 62 FR 12820; also available at *www.energy.gov/gc/office-general-counsel.* DOE examined this final rule according to UMRA and its statement of policy and determined that the rule contains neither an intergovernmental mandate, nor a mandate that may result in the expenditure of $100 million or more in any year, so these requirements do not apply.

H. Review Under the Treasury and General Government Appropriations Act, 1999

Section 654 of the Treasury and General Government Appropriations Act, 1999 (Pub. L. 105–277) requires Federal agencies to issue a Family Policymaking Assessment for any rule that may affect family well-being. This final rule will not have any impact on the autonomy or integrity of the family as an institution. Accordingly, DOE has concluded that it is not necessary to prepare a Family Policymaking Assessment.

I. Review Under Executive Order 12630

DOE has determined, under Executive Order 12630, ''Governmental Actions and Interference with Constitutionally Protected Property Rights'' 53 FR 8859 (March 18, 1988), that this regulation will not result in any takings that might require compensation under the Fifth Amendment to the U.S. Constitution.

J. Review Under Treasury and General Government Appropriations Act, 2001

Section 515 of the Treasury and General Government Appropriations Act, 2001 (44 U.S.C. 3516 note) provides for agencies to review most disseminations of information to the public under guidelines established by each agency pursuant to general guidelines issued by OMB. OMB's guidelines were published at 67 FR 8452 (Feb. 22, 2002), and DOE's guidelines were published at 67 FR 62446 (Oct. 7, 2002). Pursuant to OMB Memorandum M–19–15, Improving Implementation of the Information Quality Act (April 24, 2019), DOE published updated guidelines which are available at *www.energy.gov/sites/prod/files/2019/12/f70/DOE%20Final%20Updated%20IQA%20Guidelines%20Dec%202019.pdf.* DOE has reviewed this final rule under the OMB and DOE guidelines and has concluded that it is consistent with applicable policies in those guidelines.

K. Review Under Executive Order 13211

Executive Order 13211, ''Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use,'' 66 FR 28355 (May 22, 2001), requires Federal agencies to prepare and submit to OMB, a Statement of Energy Effects for any significant energy action. A ''significant energy action'' is defined as any action by an agency that promulgated or is expected to lead to promulgation of a final rule, and that (1) is a significant regulatory action under Executive Order 12866, or any successor order; and (2) is likely to have a significant adverse effect on the supply, distribution, or use of energy; or (3) is designated by the Administrator of OIRA as a significant energy action. For any significant energy action, the agency must give a detailed statement of any adverse effects on energy supply, distribution, or use if the regulation is implemented, and of

reasonable alternatives to the action and their expected benefits on energy supply, distribution, and use.

This regulatory action is not a significant regulatory action under Executive Order 12866. Moreover, it would not have a significant adverse effect on the supply, distribution, or use of energy, nor has it been designated as a significant energy action by the Administrator of OIRA. Therefore, it is not a significant energy action, and, accordingly, DOE has not prepared a Statement of Energy Effects.

L. Review Under Section 32 of the Federal Energy Administration Act of 1974

Under section 301 of the Department of Energy Organization Act (Pub. L. 95–91; 42 U.S.C. 7101), DOE must comply with section 32 of the Federal Energy Administration Act of 1974, as amended by the Federal Energy Administration Authorization Act of 1977. (15 U.S.C. 788; ''FEAA'') Section 32 essentially provides in relevant part that, where a proposed rule authorizes or requires use of commercial standards, the notice of proposed rulemaking must inform the public of the use and background of such standards. In addition, section 32(c) requires DOE to consult with the Attorney General and the Chairman of the Federal Trade Commission (''FTC'') concerning the impact of the commercial or industry standards on competition.

The modifications to the test procedure for DX–DOASes adopted in this final rule incorporates testing methods contained in certain sections of the following commercial standards: AHRI 920–2020, AHRI 1060–2018, ANSI/ASHRAE 37–2009, ANSI/ASHRAE 41.1–2013, ANSI/ASHRAE 41.6–2014, and ANSI/ASHRAE 198–2013. DOE has evaluated these standards and is unable to conclude whether they fully comply with the requirements of section 32(b) of the FEAA (*i.e.,* whether they were developed in a manner that fully provides for public participation, comment, and review.) DOE has consulted with both the Attorney General and the Chairman of the FTC about the impact on competition of using the methods contained in these standards and has received no comments objecting to their use.

M. Congressional Notification

As required by 5 U.S.C. 801, DOE will report to Congress on the promulgation of this rule before its effective date. The report will state that it has been determined that the rule is not a ''major rule'' as defined by 5 U.S.C. 804(2).

N. Description of Materials Incorporated by Reference

In this final rule, DOE incorporates by reference the following test standards:

(1) The test standard published by AHRI, titled ''2020 Standard for Performance Rating of Direct Expansion-Dedicated Outdoor Air System Units,'' AHRI Standard 920 (I–P)–2020. AHRI Standard 920 (I–P)–2020 is an industry-accepted test procedure for measuring the performance of DX-dedicated outdoor air system units. AHRI 920 (I–P)–2020 is available on AHRI's website at: *www.ahrinet.org/App_Content/ahri/files/STANDARDS/AHRI/AHRI_Standard_920_I-P_2020.pdf.*

(2) The test standard published by AHRI, titled ''2018 Standard for Performance Rating of Air-to-Air Exchangers for Energy Recovery Ventilation Equipment,'' AHRI Standard 1060 (I–P)–2018. AHRI Standard 1060 (I–P)–2018 is an industry-accepted test procedure for measuring the performance of air-to-air exchangers for energy recovery ventilation equipment. ANSI/AHRI Standard 1060 (I–P)–2018 is available on AHRI's website at: *www.ahrinet.org/App_Content/ahri/files/STANDARDS/AHRI/AHRI_Standard_1060_I-P_2018.pdf.*

(3) The test standard test standard published by ASHRAE, titled ''Methods of Testing for Rating Electrically Driven Unitary Air-Conditioning and Heat Pump Equipment,'' ANSI/ASHRAE Standard 37–2009. ANSI/ASHRAE Standard 37–2009 is an industry-accepted test procedure for measuring the performance of electrically driven unitary air-conditioning and heat pump equipment. ANSI/ASHRAE Standard 37–2009 is available on ASHRAE's website (in partnership with Techstreet) at: *www.techstreet.com/ashrae/standards/ashrae-37-2009?product_id=1650947.*

(4) The test standard published by ASHRAE, titled ''Standard Method for Temperature Measurement,'' ANSI/ASHRAE Standard 41.1–2013. ANSI/ASHRAE Standard 41.1–2013 is an industry-accepted test procedure for measuring temperature. ANSI/ASHRAE Standard 41.1–2013 is available on ASHRAE's website (in partnership with Techstreet) at: *www.techstreet.com/ashrae/standards/ashrae-41-1-2013?product_id=1853241.*

(5) The test standard published by ASHRAE, titled ''Standard Method for Humidity Measurement,'' ANSI/ASHRAE Standard 41.6–2014. ANSI/ASHRAE Standard 41.6–2014 is an industry-accepted test procedure for measuring humidity. ANSI/ASHRAE Standard 41.6–2014 is available on ASHRAE's website (in partnership with Techstreet) at: *www.techstreet.com/ashrae/standards/ashrae-41-6-2014?product_id=1881840.*

(6) The test standard published by ASHRAE, titled ''Method for Test for Rating DX-Dedicated Outdoor Air Systems for Moisture Removal Capacity and Moisture Removal Efficiency,'' ANSI/ASHRAE Standard 198–2013. ANSI/ASHRAE Standard 198–2013 is an industry-accepted test procedure for measuring the performance of DX-dedicated outdoor air system units. ANSI/ASHRAE Standard 198–2013 is available on ASHRAE's website (in partnership with Techstreet) at: *www.techstreet.com/ashrae/standards/ashrae-198-2013?product_id=1852612.*

The following standards were previously approved for incorporation by reference in the section where they appear: AHRI 210/240–2008, AHRI 340/360–2007, AHRI 390–2003, ASHRAE 127–2007, AHRI 1230–2010, ISO Standard 13256–1.

V. Approval of the Office of the Secretary

The Secretary of Energy has approved publication of this final rule.

List of Subjects

10 CFR Part 429

Administrative practice and procedure, Confidential business information, Energy conservation, Household appliances, Imports, Intergovernmental relations, Reporting and recordkeeping requirements, Small businesses.

10 CFR Part 431

Administrative practice and procedure, Confidential business information, Energy conservation test procedures, Incorporation by reference, and Reporting and recordkeeping requirements.

Signing Authority

This document of the Department of Energy was signed on July 14, 2022, by Kelly J. Speakes-Backman, Principal Deputy Assistant Secretary for Energy Efficiency and Renewable Energy, pursuant to delegated authority from the Secretary of Energy. That document with the original signature and date is maintained by DOE. For administrative purposes only, and in compliance with requirements of the Office of the Federal Register, the undersigned DOE Federal Register Liaison Officer has been authorized to sign and submit the document in electronic format for publication, as an official document of the Department of Energy. This administrative process in no way alters

the legal effect of this document upon publication in the **Federal Register**.

Signed in Washington, DC, on July 15, 2022.

Treena V. Garrett,

Federal Register Liaison Officer, U.S. Department of Energy.

For the reasons stated in the preamble, DOE amends parts 429 and 431 of chapter II of title 10, Code of Federal Regulations as set forth below:

PART 429—CERTIFICATION, COMPLIANCE, AND ENFORCEMENT FOR CONSUMER PRODUCTS AND COMMERCIAL AND INDUSTRIAL EQUIPMENT

■ 1. The authority citation for part 429 continues to read as follows:

Authority: 42 U.S.C. 6291–6317; 28 U.S.C. 2461 note.

■ 2. Amend § 429.43 by adding paragraph (a)(3) to read as follows:

§ 429.43 Commercial heating, ventilating, air conditioning (HVAC) equipment.

(a) * * *

(3) *Product-specific provisions for determination of represented values.* (i) Direct-expansion-dedicated outdoor air systems (DX–DOASes):

(A) Individual model selection:

(*1*) Representations for a basic model must be based on the least efficient individual model(s) distributed in commerce among all otherwise comparable model groups comprising the basic model, considering only individual models as provided in paragraph (a)(3)(i)(A)(*2*) of this section. For the purpose of this paragraph (a)(3), an ''otherwise comparable model group'' means a group of individual models distributed in commerce within the basic model that do not differ in components that affect energy consumption as measured according to the applicable test procedure specified at 10 CFR 431.96 other than those listed in Table 1 to paragraph (a)(3) of this section. An otherwise comparable model group may include individual models distributed in commerce with any combination of the components listed in Table 1 (or none of the components listed in Table 1). An otherwise comparable model group may consist of only one individual model.

(*2*) For a basic model that includes individual models distributed in commerce with components listed in Table 1 to paragraph (a)(3) of this section, the requirements for determining representations apply only to the individual model(s) of a specific otherwise comparable model group distributed in commerce with the least number (which could be zero) of components listed in Table 1 included in individual models of the group. Testing under this paragraph shall be consistent with any component-specific test provisions specified in section 2.2.2 of appendix B to subpart F of part 431.

TABLE 1 TO PARAGRAPH (a)(3)

Component	Description
Furnaces and Steam/Hydronic Heat Coils	Furnaces and steam/hydronic heat coils used to provide primary or supplementary heating.
Ducted Condenser Fans	A condenser fan/motor assembly designed for optional external ducting of condenser air that provides greater pressure rise and has a higher rated motor horsepower than the condenser fan provided as a standard component with the equipment.
Sound Traps/Sound Attenuators	An assembly of structures through which the supply air passes before leaving the equipment or through which the return air from the building passes immediately after entering the equipment, for which the sound insertion loss is at least 6 dB for the 125 Hz octave band frequency range.
VERS Preheat	Electric resistance, hydronic, or steam heating coils used for preheating outdoor air entering a VERS.

* * * * *

■ 3. Amend § 429.70 by revising the tables in paragraphs (c)(2)(iv) and (c)(5)(vi)(B) to read as follows:

§ 429.70 Alternative methods for determining energy efficiency and energy use.

* * * * *

(c) * * *

(2) * * *

(iv) * * *

Validation class	Minimum number of distinct models that must be tested per AEDM
Air-Cooled, Split and Packaged Air Conditioners (ACs) and Heat Pumps (HPs) less than 65,000 Btu/h Cooling Capacity (3-Phase).	2 Basic Models.
(A) Commercial HVAC Validation Classes	
Air-Cooled, Split and Packaged ACs and HPs greater than or equal to 65,000 Btu/h Cooling Capacity and Less than 760,000 Btu/h Cooling Capacity.	2 Basic Models.
Water-Cooled, Split and Packaged ACs and HPs, All Cooling Capacities	2 Basic Models.
Evaporatively-Cooled, Split and Packaged ACs and HPs, All Capacities	2 Basic Models.
Water-Source HPs, All Capacities	2 Basic Models.
Single Package Vertical ACs and HPs	2 Basic Models.
Packaged Terminal ACs and HPs	2 Basic Models.
Air-Cooled, Variable Refrigerant Flow ACs and HPs	2 Basic Models.
Water-Cooled, Variable Refrigerant Flow ACs and HPs	2 Basic Models.
Computer Room Air Conditioners, Air Cooled	2 Basic Models.
Computer Room Air Conditioners, Water-Cooled	2 Basic Models.
Direct Expansion-Dedicated Outdoor Air Systems, Air-cooled or Air-source Heat Pump, Without Ventilation Energy Recovery Systems.	2 Basic Models.
Direct Expansion-Dedicated Outdoor Air Systems, Air-cooled or Air-source Heat Pump, With Ventilation Energy Recovery Systems.	2 Basic Models.

Validation class	Minimum number of distinct models that must be tested per AEDM
Direct Expansion-Dedicated Outdoor Air Systems, Water-cooled, Water-source Heat Pump, or Ground Source Closed-loop Heat Pump, Without Ventilation Energy Recovery Systems.	2 Basic Models.
Direct Expansion-Dedicated Outdoor Air Systems, Water-cooled, Water-source Heat Pump, or Ground Source Closed-loop Heat Pump, With Ventilation Energy Recovery Systems.	2 Basic Models.
(B) Commercial Water Heater Validation Classes	
Gas-fired Water Heaters and Hot Water Supply Boilers Less than 10 Gallons	2 Basic Models.
Gas-fired Water Heaters and Hot Water Supply Boilers Greater than or Equal to 10 Gallons	2 Basic Models.
Oil-fired Water Heaters and Hot Water Supply Boilers Less than 10 Gallons	2 Basic Models.
Oil-fired Water Heaters and Hot Water Supply Boilers Greater than or Equal to 10 Gallons	2 Basic Models.
Electric Water Heaters	2 Basic Models.
Heat Pump Water Heaters	2 Basic Models.
Unfired Hot Water Storage Tanks	2 Basic Models.
(C) Commercial Packaged Boilers Validation Classes	
Gas-fired, Hot Water Only Commercial Packaged Boilers	2 Basic Models.
Gas-fired, Steam Only Commercial Packaged Boilers	2 Basic Models.
Gas-fired Hot Water/Steam Commercial Packaged Boilers	2 Basic Models.
Oil-fired, Hot Water Only Commercial Packaged Boilers	2 Basic Models.
Oil-fired, Steam Only Commercial Packaged Boilers	2 Basic Models.
Oil-fired Hot Water/Steam Commercial Packaged Boilers	2 Basic Models.
(D) Commercial Furnace Validation Classes	
Gas-fired Furnaces	2 Basic Models.
Oil-fired Furnaces	2 Basic Models.
(E) Commercial Refrigeration Equipment Validation Classes [1]	
Self-Contained Open Refrigerators	2 Basic Models.
Self-Contained Open Freezers	2 Basic Models.
Remote Condensing Open Refrigerators	2 Basic Models.
Remote Condensing Open Freezers	2 Basic Models.
Self-Contained Closed Refrigerators	2 Basic Models.
Self-Contained Closed Freezers	2 Basic Models.
Remote Condensing Closed Refrigerators	2 Basic Models.
Remote Condensing Closed Freezers	2 Basic Models.

[1] The minimum number of tests indicated above must be comprised of a transparent model, a solid model, a vertical model, a semi-vertical model, a horizontal model, and a service-over-the counter model, as applicable based on the equipment offering. However, manufacturers do not need to include all types of these models if it will increase the minimum number of tests that need to be conducted.

* * * * *

(B) * * *

(5) * * *

(vi) * * *

Equipment	Metric	Applicable tolerance (%)
Commercial Packaged Boilers	Combustion Efficiency	5 (0.05)
	Thermal Efficiency	5 (0.05)
Commercial Water Heaters or Hot Water Supply Boilers	Thermal Efficiency	5 (0.05)
	Standby Loss	10 (0.1)
Unfired Storage Tanks	R-Value	10 (0.1)
Air-Cooled, Split and Packaged ACs and HPs less than 65,000 Btu/h Cooling Capacity (3-Phase).	Seasonal Energy-Efficiency Ratio	5 (0.05)
	Heating Season Performance Factor	5 (0.05)
	Energy Efficiency Ratio	10 (0.1)
Air-Cooled, Split and Packaged ACs and HPs greater than or equal to 65,000 Btu/h Cooling Capacity and Less than 760,000 Btu/h Cooling Capacity.	Energy Efficiency Ratio	5 (0.05)
	Coefficient of Performance	5 (0.05)
	Integrated Energy Efficiency Ratio	10 (0.1)
Water-Cooled, Split and Packaged ACs and HPs, All Cooling Capacities.	Energy Efficiency Ratio	5 (0.05)
	Coefficient of Performance	5 (0.05)
	Integrated Energy Efficiency Ratio	10 (0.1)
Evaporatively-Cooled, Split and Packaged ACs and HPs, All Capacities.	Energy Efficiency Ratio	5 (0.05)
	Coefficient of Performance	5 (0.05)
	Integrated Energy Efficiency Ratio	10 (0.1)

Equipment	Metric	Applicable tolerance (%)
Water-Source HPs, All Capacities	Energy Efficiency Ratio	5 (0.05)
	Coefficient of Performance	5 (0.05)
	Integrated Energy Efficiency Ratio	10 (0.1)
Single Package Vertical ACs and HPs	Energy Efficiency Ratio	5 (0.05)
	Coefficient of Performance	5 (0.05)
Packaged Terminal ACs and HPs	Energy Efficiency Ratio	5 (0.05)
	Coefficient of Performance	5 (0.05)
Variable Refrigerant Flow ACs and HPs	Energy Efficiency Ratio	5 (0.05)
	Coefficient of Performance	5 (0.05)
	Integrated Energy Efficiency Ratio	10 (0.1)
Computer Room Air Conditioners	Net Sensible Coefficient of Performance	5 (0.05)
Direct Expansion-Dedicated Outdoor Air Systems	Integrated Seasonal Coefficient of Performance 2	10 (0.1)
	Integrated Seasonal Moisture Removal Efficiency 2	10 (0.1)
Commercial Warm-Air Furnaces	Thermal Efficiency	5 (0.05)
Commercial Refrigeration Equipment	Daily Energy Consumption	5 (0.05)

* * * * *

■ 4. Amend § 429.134 by adding paragraph (s) to read as follows:

§ 429.134 Product-specific enforcement provisions.

* * * * *

(s) *Direct Expansion-Dedicated Outdoor Air Systems.* (1) If a basic model includes individual models with components listed at Table 1 of § 429.43(a)(3) and DOE is not able to obtain an individual model with the least number (which could be zero) of those components within an otherwise comparable model group (as defined in § 429.43(a)(3)(i)(A)(*1*)), DOE may test any individual model within the otherwise comparable model group.

(2) [Reserved].

PART 431—ENERGY EFFICIENCY PROGRAM FOR CERTAIN COMMERCIAL AND INDUSTRIAL EQUIPMENT

■ 5. The authority citation for part 431 continues to read as follows:

Authority: 42 U.S.C. 6291–6317; 28 U.S.C. 2461 note.

■ 6. Amend § 431.2 by revising the definition for ''Commercial HVAC & WH product'' to read as follows:

§ 431.2 Definitions.

* * * * *

Commercial HVAC & WH product means any small, large, or very large commercial package air-conditioning and heating equipment (as defined in § 431.92), packaged terminal air conditioner (as defined in § 431.92), packaged terminal heat pump (as defined in § 431.92), single package vertical air conditioner (as defined in § 431.92), single package vertical heat pump (as defined in § 431.92), computer room air conditioner (as defined in § 431.92), variable refrigerant flow multi-split air conditioner (as defined in § 431.92), variable refrigerant flow multi-split heat pump (as defined in § 431.92), unitary dedicated outdoor air system (as defined in § 431.92), commercial packaged boiler (as defined in § 431.82), hot water supply boiler (as defined in § 431.102), commercial warm air furnace (as defined in § 431.72), instantaneous water heater (as defined in § 431.102), storage water heater (as defined in § 431.102), or unfired hot water storage tank (as defined in § 431.102).

* * * * *

■ 7. Amend § 431.92 by:

■ a. Revising the definition for ''Basic model''; and

■ b. Adding, in alphabetical order, definitions for ''Direct expansion-dedicated outdoor air system, or DX–DOAS,'' ''Integrated seasonal coefficient of performance 2, or ISCOP2,'' ''Integrated seasonal moisture removal efficiency 2, or ISMRE2,'' ''Unitary dedicated outdoor air system, or unitary DOAS,'' and ''Ventilation energy recovery system, or VERS''.

The revision and additions read as follows:

§ 431.92 Definitions concerning commercial air conditioners and heat pumps.

* * * * *

Basic model includes:

(1) *Computer room air conditioners* means all units manufactured by one manufacturer within a single equipment class, having the same primary energy source (*e.g.,* electric or gas), and which have the same or comparably performing compressor(s), heat exchangers, and air moving system(s) that have a common ''nominal'' cooling capacity.

(2) *Direct expansion-dedicated outdoor air system* means all units manufactured by one manufacturer, having the same primary energy source (*e.g.,* electric or gas), within a single equipment class; with the same or comparably performing compressor(s), heat exchangers, ventilation energy recovery system(s) (if present), and air moving system(s) that have a common ''nominal'' moisture removal capacity.

(3) *Packaged terminal air conditioner (PTAC) or packaged terminal heat pump (PTHP)* means all units manufactured by one manufacturer within a single equipment class, having the same primary energy source (*e.g.,* electric or gas), and which have the same or comparable compressors, same or comparable heat exchangers, and same or comparable air moving systems that have a cooling capacity within 300 Btu/h of one another.

(4) *Single package vertical units* means all units manufactured by one manufacturer within a single equipment class, having the same primary energy source (*e.g.,* electric or gas), and which have the same or comparably performing compressor(s), heat exchangers, and air moving system(s) that have a rated cooling capacity within 1500 Btu/h of one another.

(5) *Small, large, and very large air-cooled or water-cooled commercial package air conditioning and heating equipment* means all units manufactured by one manufacturer within a single equipment class, having the same or comparably performing compressor(s), heat exchangers, and air moving system(s) that have a common ''nominal'' cooling capacity.

(6) *Small, large, and very large water source heat pump* means all units manufactured by one manufacturer within a single equipment class, having the same primary energy source (*e.g.,* electric or gas), and which have the same or comparable compressors, same or comparable heat exchangers, and

same or comparable ''nominal'' capacity.

(7) *Variable refrigerant flow systems* means all units manufactured by one manufacturer within a single equipment class, having the same primary energy source (*e.g.,* electric or gas), and which have the same or comparably performing compressor(s) that have a common ''nominal'' cooling capacity and the same heat rejection medium (*e.g.,* air or water) (includes VRF water source heat pumps).

* * * * *

Direct expansion-dedicated outdoor air system, or DX–DOAS, means a unitary dedicated outdoor air system that is capable of dehumidifying air to a 55 °F dew point—when operating under Standard Rating Condition A as specified in Table 4 or Table 5 of AHRI 920–2020 (incorporated by reference, see § 431.95) with a barometric pressure of 29.92 in Hg—for any part of the range of airflow rates advertised in manufacturer materials, and has a moisture removal capacity of less than 324 lb/h.

* * * * *

Integrated seasonal coefficient of performance 2, or ISCOP2, means a seasonal weighted-average heating efficiency for heat pump dedicated outdoor air systems, expressed in W/W, as measured according to appendix B of this subpart.

Integrated seasonal moisture removal efficiency 2, or ISMRE2, means a seasonal weighted average dehumidification efficiency for dedicated outdoor air systems, expressed in lbs. of moisture/kWh, as measured according to appendix B of this subpart.

* * * * *

Unitary dedicated outdoor air system, or *unitary DOAS,* means a category of small, large, or very large commercial package air-conditioning and heating equipment that is capable of providing ventilation and conditioning of 100-percent outdoor air and is marketed in materials (including but not limited to, specification sheets, insert sheets, and online materials) as having such capability.

* * * * *

Ventilation energy recovery system, or VERS, means a system that preconditions outdoor ventilation air entering the equipment through direct or indirect thermal and/or moisture exchange with the exhaust air, which is defined as the building air being exhausted to the outside from the equipment.

* * * * *

■ 8. Section 431.95 is amended by:

■ a. Revising paragraphs (a) and (b);

■ b. Revising the introductory text of paragraph (c) and paragraph (c)(2);

■ c. Redesignating paragraphs (c)(3) and (4) as (c)(5) and (6); and

■ d. Adding new paragraphs (c)(3) and (4), and paragraph (c)(7).

The revisions and additions read as follows:

§ 431.95 Materials incorporated by reference.

(a) Certain material is incorporated by reference into this subpart with the approval of the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. To enforce any edition other than that specified in this section, DOE must publish a document in the **Federal Register** and the material must be available to the public. All approved incorporation by reference (IBR) material is available for inspection at DOE, and at the National Archives and Records Administration (NARA). Contact DOE at: the U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Building Technologies Program, Sixth Floor, 950 L'Enfant Plaza SW, Washington, DC 20024, (202) 586–9127, *Buildings@ee.doe.gov, https://www.energy.gov/eere/buildings/building-technologies-office.* For information on the availability of this material at NARA, email: *fr.inspection@nara.gov,* or go to: *www.archives.gov/federal-register/cfr/ibr-locations.html.* The material may be obtained from the sources in the following paragraphs of this section.

(b) *AHRI.* Air-Conditioning, Heating, and Refrigeration Institute, 2311 Wilson Blvd., Suite 400, Arlington, VA 22201; (703) 524–8800; *www.ahrinet.org.*

(1) ANSI/AHRI Standard 210/240–2008 (AHRI 210/240–2008), ''2008 Standard for Performance Rating of Unitary Air-Conditioning & Air-Source Heat Pump Equipment,'' ANSI-approved October 27, 2011, and updated by addendum 1 in June 2011 and addendum 2 in March 2012; IBR approved for § 431.96.

(2) AHRI Standard 310/380–2014 (''AHRI 310/380–2014''), ''Standard for Packaged Terminal Air-Conditioners and Heat Pumps,'' February 2014; IBR approved for § 431.96.

(3) ANSI/AHRI Standard 340/360–2007 (AHRI 340/360–2007), ''2007 Standard for Performance Rating of Commercial and Industrial Unitary Air-Conditioning and Heat Pump Equipment,'' ANSI-approved October 27, 2011, and updated by addendum 1 in December 2010 and addendum 2 in June 2011; IBR approved for § 431.96; appendix A to this subpart.

(4) ANSI/AHRI Standard 390–2003 (AHRI 390–2003), ''2003 Standard for Performance Rating of Single Package Vertical Air-Conditioners and Heat Pumps,'' dated 2003; IBR approved for § 431.96.

(5) AHRI Standard 920 (I–P) with Addendum 1 (''AHRI 920–2020''), ''2020 Standard for Performance Rating of Direct Expansion-Dedicated Outdoor Air System Units,'' copyright 2021; IBR approved for § 431.92; appendix B to this subpart.

(6) AHRI Standard 1060 (I–P) (''AHRI 1060–2018''), ''2018 Standard for Performance Rating of Air-to-Air Exchangers for Energy Recovery Ventilation Equipment,'' copyright 2018; IBR approved for appendix B to this subpart.

(7) ANSI/AHRI Standard 1230–2010 (AHRI 1230–2010), ''2010 Standard for Performance Rating of Variable Refrigerant Flow (VRF) Multi-Split Air-Conditioning and Heat Pump Equipment,'' approved August 2, 2010, and updated by addendum 1 in March 2011; IBR approved for § 431.96.

(c) *ASHRAE.* American Society of Heating, Refrigerating and Air-Conditioning Engineers, 180 Technology Parkway, Peachtree Corners, Georgia 30092; (404) 636–8400; *www.ashrae.org.*

* * * * *

(2) ANSI/ASHRAE Standard 37–2009 (''ANSI/ASHRAE 37'' or ''ANSI/ASHRAE 37–2009''), ''Methods of Testing for Rating Electrically Driven Unitary Air-Conditioning and Heat Pump Equipment,'' ASHRAE-approved June 24, 2009; IBR approved for § 431.96; appendices A and B to this subpart.

(3) ANSI/ASHRAE Standard 41.1–2013 (''ANSI/ASHRAE 41.1–2013''), ''Standard Method for Temperature Measurement,'' ANSI-approved January 30, 2013; IBR approved for appendix B to this subpart.

(4) ANSI/ASHRAE Standard 41.6–2014 (''ANSI/ASHRAE 41.6–2014''), ''Standard Method for Humidity Measurement,'' ANSI-approved July 3, 2014; IBR approved for appendix B to this subpart.

* * * * *

(7) ANSI/ASHRAE Standard 198–2013 (''ANSI/ASHRAE 198–2013''), ''Method of Test for Rating DX-Dedicated Outdoor Air Systems for Moisture Removal Capacity and Moisture Removal Efficiency,'' ANSI-approved January 30, 2013; IBR approved for appendix B to this subpart.

* * * * *

■ 9. Amend § 431.96 by:

■ a. Revising paragraph (a);

■ b. Redesignating table 1 to § 431.96 as table 1 to paragraph (b) and revising newly redesignated table 1 to paragraph (b); and

■ c. Designating the table in paragraph (d) as table 2 to paragraph (d).

The revisions read as follows:

§ 431.96 Uniform test method for the measurement of energy efficiency of commercial air conditioners and heat pumps.

(a) *Scope.* This section contains test procedures for measuring, pursuant to EPCA, the energy efficiency of any small, large, or very large commercial package air-conditioning and heating equipment, packaged terminal air conditioners and packaged terminal heat pumps, computer room air conditioners, variable refrigerant flow systems, single package vertical air conditioners and single package vertical heat pumps, and direct expansion-dedicated outdoor air systems.

(b) * * *

(2) * * *

TABLE 1 TO PARAGRAPH (b)—TEST PROCEDURES FOR COMMERCIAL AIR CONDITIONERS AND HEAT PUMPS

Equipment type	Category	Cooling capacity or moisture removal capacity [2]	Energy efficiency descriptor	Use tests, conditions, and procedures [1] in	Additional test procedure provisions as indicated in the listed paragraphs of this section
Small Commercial Package Air-Conditioning and Heating Equipment.	Air-Cooled, 3-Phase, AC and HP.	<65,000 Btu/h	SEER and HSPF	AHRI 210/240–2008 (omit section 6.5).	Paragraphs (c) and (e).
	Air-Cooled AC and HP	≥65,000 Btu/h and <135,000 Btu/h.	EER, IEER, and COP	Appendix A to this subpart.	None.
	Water-Cooled and Evaporatively-Cooled AC.	<65,000 Btu/h	EER	AHRI 210/240–2008 (omit section 6.5).	Paragraphs (c) and (e).
		≥65,000 Btu/h and <135,000 Btu/h.	EER	AHRI 340/360–2007 (omit section 6.3).	Paragraphs (c) and (e).
	Water-Source HP	<135,000 Btu/h	EER and COP	ISO Standard 13256–1 (1998).	Paragraph (e).
Large Commercial Package Air-Conditioning and Heating Equipment.	Air-Cooled AC and HP	≥135,000 Btu/h and <240,000 Btu/h.	EER, IEER and COP	Appendix A to this subpart.	None.
	Water-Cooled and Evaporatively-Cooled AC.	≥135,000 Btu/h and <240,000 Btu/h.	EER	AHRI 340/360–2007 (omit section 6.3).	Paragraphs (c) and (e).
Very Large Commercial Package Air-Conditioning and Heating Equipment.	Air-Cooled AC and HP	≥240,000 Btu/h and <760,000 Btu/h.	EER, IEER and COP	Appendix A to this subpart.	None.
	Water-Cooled and Evaporatively-Cooled AC.	≥240,000 Btu/h and <760,000 Btu/h.	EER	AHRI 340/360–2007 (omit section 6.3).	Paragraphs (c) and (e).
Packaged Terminal Air Conditioners and Heat Pumps.	AC and HP	<760,000 Btu/h	EER and COP	Paragraph (g) of this section.	Paragraphs (c), (e), and (g).
Computer Room Air Conditioners.	AC	<65,000 Btu/h	SCOP	ASHRAE 127–2007 (omit section 5.11).	Paragraphs (c) and (e).
		≥65,000 Btu/h and <760,000 Btu/h.	SCOP	ASHRAE 127–2007 (omit section 5.11).	Paragraphs (c) and (e).
Variable Refrigerant Flow Multi-split Systems.	AC	<65,000 Btu/h (3-phase)	SEER	AHRI 1230–2010 (omit sections 5.1.2 and 6.6).	Paragraphs (c), (d), (e), and (f).
		≥65,000 Btu/h and <760,000 Btu/h.	EER	AHRI 1230–2010 (omit sections 5.1.2 and 6.6).	Paragraphs (c), (d), (e), and (f).
Variable Refrigerant Flow Multi-split Systems, Air-cooled.	HP	<65,000 Btu/h (3-phase)	SEER and HSPF	AHRI 1230–2010 (omit sections 5.1.2 and 6.6).	Paragraphs (c), (d), (e), and (f).
		≥65,000 Btu/h and <760,000 Btu/h.	EER and COP	AHRI 1230–2010 (omit sections 5.1.2 and 6.6).	Paragraphs (c), (d), (e), and (f).
Variable Refrigerant Flow Multi-split Systems, Water-source.	HP	<760,000 Btu/h	EER and COP	AHRI 1230–2010 (omit sections 5.1.2 and 6.6).	Paragraphs (c), (d), (e), and (f).
Single Package Vertical Air Conditioners and Single Package Vertical Heat Pumps.	AC and HP	<760,000 Btu/h	EER and COP	AHRI 390–2003 (omit section 6.4).	Paragraphs (c) and (e).
Direct Expansion-Dedicated Outdoor Air Systems.	All	<324 lbs. of moisture removal/hr.	ISMRE2 and ISCOP2	Appendix B of this subpart.	None.

[1] Incorporated by reference; see § 431.95.
[2] Moisture removal capacity is determined according to appendix B of this subpart.

* * * * *

■ 10. Add Appendix B to subpart F of part 431 to read as follows:

Appendix B to Subpart F of Part 431—Uniform Test Method For Measuring the Energy Consumption of Direct Expansion-Dedicated Outdoor Air Systems

Note: Beginning July 24, 2023, representations with respect to energy use or efficiency of direct expansion-dedicated outdoor air systems must be based on testing conducted in accordance with this appendix. Manufacturers may elect to use this appendix early.

1. Incorporation by Reference

DOE incorporated by reference in § 431.95, the entire standard for AHRI 920–2020, AHRI 1060–2018; ANSI/ASHRAE 37–2009, ANSI/ASHRAE 41.1–2013, ANSI/ASHRAE 41.6–2014, and ANSI/ASHRAE 198–2013. However, only enumerated provisions of

AHRI 920–2020, ANSI/ASHRAE 37–2009, ANSI/ASHRAE 41.6–2014, and ANSI/ASHRAE 198–2013, as listed in this section 1 are required. To the extent there is a conflict between the terms or provisions of a referenced industry standard and the CFR, the CFR provisions control.

1.1. AHRI 920–2020

(a) Section 3—Definitions, as specified in section 2.2.1(a) of this appendix;

(b) Section 5—Test Requirements, as specified in section 2.2.1(b) of this appendix;

(c) Section 6—Rating Requirements, as specified in section 2.2.1(c) of this appendix, omitting section 6.1.2 (but retaining sections 6.1.2.1–6.1.2.8) and 6.6.1;

(d) Section 11—Symbols and Subscripts, as specified in section 2.2.1(d) of this appendix;

(e) Appendix A—References—Normative, as specified in section 2.2.1(e) of this appendix; and

(f) Appendix C—ANSI/ASHRAE Standard 198 and ANSI/ASHRAE Standard 37 Additions, Clarifications and Exceptions—Normative, as specified in section 2.2.1(f) of this appendix.

1.2. ANSI/ASHRAE 37–2009

(a) Section 5.1—Temperature Measuring Instruments (excluding sections 5.1.1 and 5.1.2), as specified in sections 2.2.1(b) and (f) of this appendix;

(b) Section 5.2—Refrigerant, Liquid, and Barometric Pressure Measuring Instruments, as specified in section 2.2.1(b) of this appendix;

(c) Sections 5.3—Air Differential Pressure and Airflow Measurements, as specified in section 2.2.1(b) of this appendix;

(d) Sections 5.5(b)—Volatile Refrigerant Measurement, as specified in section 2.2.1(b) of this appendix;

(e) Section 6.1—Enthalpy Apparatus (excluding 6.1.1 and 6.1.3 through 6.1.6), as specified in section 2.2.1(b) of this appendix;

(f) Section 6.2—Nozzle Airflow Measuring Apparatus, as specified in section 2.2.1(b) of this appendix;

(g) Section 6.3—Nozzles, as specified in section 2.2.1(b) of this appendix;

(h) Section 6.4—External Static Pressure Measurements, as specified in section 2.2.1(b) of this appendix;

(i) Section 6.5—Recommended Practices for Static Pressure Measurements, as specified in section 2.2.1(f) of this appendix;

(j) Section 7.3—Indoor and Outdoor Air Enthalpy Methods, as specified in section 2.2.1(f) of this appendix;

(k) Section 7.4—Compressor Calibration Method, as specified in section 2.2.1(f) of this appendix;

(l) Section 7.5—Refrigerant Enthalpy Method, as specified in section 2.2.1(f) of this appendix;

(m) Section 7.6—Outdoor Liquid Coil Method, as specified in section 2.2.1(f) of this appendix;

(n) Section 7.7—Airflow Rate Measurement (excluding sections 7.7.1.2, 7.7.3, and 7.7.4), as specified in section 2.2.1(b) of this appendix;

(o) Table 1—Applicable Test Methods, as specified in section 2.2.1(f) of this appendix;

(p) Section 8.6—Additional Requirements for the Outdoor Air Enthalpy Method, as specified in section 2.2.1(f) of this appendix;

(q) Table 2b—Test Tolerances (I–P Units), as specified in sections 2.2.1(c) and 2.2(f) of this appendix; and

(r) Errata sheet issued on October 3, 2016, as specified in section 2.2.1(f) of this appendix.

1.3. ANSI/ASHRAE 41.6–2014

(a) Section 4—Classifications, as specified in section 2.2.1(f) of this appendix;

(b) Section 5—Requirements, as specified in section 2.2.1(f) of this appendix;

(c) Section 6—Instruments and Calibration, as specified in section 2.2.1(f) of this appendix;

(d) Section 7.1—Standard Method Using the Cooled-Surface Condensation Hygrometer as specified in section 2.2.1(f) of this appendix; and

(e) Section 7.4—Electronic and Other Humidity Instruments. As specified in section 2.2.1(f) of this appendix.

1.4. ANSI/ASHRAE 198–2013

(a) Section 4.4—Temperature Measuring Instrument, as specified in section 2.2.1(b) of this appendix;

(b) Section 4.5—Electrical Instruments, as specified in section 2.2.1(b) of this appendix;

(c) Section 4.6—Liquid Flow Measurement, as specified in section 2.2.1(b) of this appendix;

(d) Section 4.7—Time and Mass Measurements, as specified in section 2.2.1(b) of this appendix;

(e) Section 6.1—Test Room Requirements, as specified in section 2.2.1(b) of this appendix;

(f) Section 6.6—Unit Preparation, as specified in section 2.2.1(b) of this appendix;

(g) Section 7.1—Preparation of the Test Room(s), as specified in section 2.2.1(b) of this appendix;

(h) Section 7.2—Equipment Installation, as specified in section 2.2.1(b) of this appendix;

(i) Section 8.2—Equilibrium, as specified in section 2.2.1(b) of this appendix; and

(j) Section 8.4—Test Duration and Measurement Frequency, as specified in section 2.2.1(b) of this appendix.

2. Test Method

2.1. Capacity

Moisture removal capacity (in pounds per hour) and supply airflow rate (in standard cubic feet per minute) are determined according to AHRI 920–2020 as specified in section 2.2 of this appendix.

2.2. Efficiency

2.2.1. Determine the ISMRE2 for all DX–DOASes and the ISCOP2 for all heat pump DX–DOASes in accordance with the following sections of AHRI 920–2020 and the additional provisions described in this section.

(a) Section 3—Definitions, including the references to AHRI 1060–2018;

(i) Non-standard Low-static Fan Motor. A supply fan motor that cannot maintain external static pressure as high as specified in Table 7 of AHRI 920–2020 when operating at a manufacturer-specified airflow rate and that is distributed in commerce as part of an individual model within the same basic model of a DX–DOAS that is distributed in commerce with a different motor specified for testing that can maintain the required external static pressure.

(ii) Manufacturer-specified. Information provided by the manufacturer through manufacturer's installation instructions, as defined in Section 3.14 of AHRI 920–2020.

(iii) Reserved.

(b) Section 5—Test Requirements, including the references to Sections 5.1, 5.2, 5.3, 5.5, 6.1, 6.2, 6.3, 6.4, and 7.7 (not including Sections 7.7.1.2, 7.7.3, and 7.7.4) of ANSI/ASHRAE 37–2009, and Sections 4.4, 4.5, 4.6, 4.7, 5.1, 6.1, 6.6, 7.1, 7.2, 8.2, and 8.4 of ANSI/ASHRAE 198–2013;

(i) All control settings are to remain unchanged for all Standard Rating Conditions once system set up has been completed, except as explicitly allowed or required by AHRI 920–2020 or as indicated in the supplementary test instructions (STI). Component operation shall be controlled by the unit under test once the provisions in section 2.2.1(c) of this appendix are met.

(ii) Break-in. The break-in conditions and duration specified in section 5.6 of AHRI 920–2020 shall be manufacturer-specified values.

(iii) Reserved.

(c) Section 6—Rating Requirements (omitting sections 6.1.2 and 6.6.1), including the references to Table 2b of ANSI/ASHRAE 37–2009, and ANSI/ASHRAE 198–2013.

(i) For water-cooled DX–DOASes, the ''Condenser Water Entering Temperature, Cooling Tower Water'' conditions specified in Table 4 of AHRI 920–2020 shall be used. For water-source heat pump DX–DOASes, the ''Water-Source Heat Pumps'' conditions specified in Table 5 of AHRI 920–2020 shall be used.

(ii) For water-cooled or water-source DX–DOASes with integral pumps, set the external head pressure to 20 ft. of water column, with a $-0/+1$ ft. condition tolerance and a 1 ft. operating tolerance.

(iii) When using the degradation coefficient method as specified in Section 6.9.2 of AHRI 920–2020, Equation 20 applies to DX– DOAS without VERS, with deactivated VERS (see Section 5.4.3 of AHRI 920–2020), or sensible-only VERS tested under Standard Rating Conditions other than D.

(iv) Rounding requirements for representations are to be followed as stated in Sections 6.1.2.1 through 6.1.2.8 of AHRI 920–2020;

(d) Section 11—Symbols and Subscripts, including references to AHRI 1060–2018;

(e) Appendix A—References—Normative;

(f) Appendix C—ANSI/ASHRAE 198–2013 and ANSI/ASHRAE 37 Additions, Clarifications and Exceptions—Normative, including references to Sections 5.1, 6.5, 7.3, 7.4, 7.5, 7.6, 8.6, Table 1, Table 2b, and the errata sheet of ANSI/ASHRAE 37–2009, ANSI/ASHRAE 41.1–2013, Sections 4, 5, 6, 7.1, and 7.4 of ANSI/ASHRAE 41.6–2014, and AHRI 1060–2018;

(g) Appendix E—Typical Test Unit Installations—Informative, for information only.

2.2.2. Set-Up and Test Provisions for Specific Components. When testing a DX–DOAS that includes any of the features listed in Table 2.1 of this section, test in accordance with the set-up and test provisions specified in Table 2.1 of this section.

TABLE 2.1—TEST PROVISIONS FOR SPECIFIC COMPONENTS

Component	Description	Test provisions
Return and Exhaust Dampers.	An automatic system that enables a DX–DOAS Unit to supply and use some return air (even if an optional VERS is not utilized) to reduce or eliminate the need for mechanical dehumidification or heating when ventilation air requirements are less than design.	All dampers that allow return air to pass into the supply airstream shall be closed and sealed. Exhaust air dampers of DOAS units with VERS shall be open. Gravity dampers activated by exhaust fan discharge airflow shall be allowed to open by action of the exhaust airflow.
VERS Bypass Dampers	An automatic system that enables a DX–DOAS Unit to let outdoor ventilation air and return air bypass the VERS when preconditioning of outdoor ventilation is not beneficial.	Test with the VERS bypass dampers installed, closed, and sealed. However, VERS bypass dampers may be opened if necessary for testing with deactivated VERS for Standard Rating Condition D.
Fire/Smoke/Isolation Dampers.	A damper assembly including means to open and close the damper mounted at the supply or return duct opening of the equipment.	The fire/smoke/isolation dampers shall be removed for testing. If it is not possible to remove such a damper, test with the damper fully open. For any fire/smoke/isolation dampers shipped with the unit but not factory-installed, do not install the dampers for testing.
Furnaces and Steam/Hydronic Heat Coils.	Furnaces and steam/hydronic heat coils used to provide primary or supplementary heating.	Test with the coils in place but providing no heat.
Power Correction Capacitors	A capacitor that increases the power factor measured at the line connection to the equipment. These devices are a requirement of the power distribution system supplying the unit.	Remove power correction capacitors for testing.
Hail Guards	A grille or similar structure mounted to the outside of the unit covering the outdoor coil to protect the coil from hail, flying debris and damage from large objects.	Remove hail guards for testing.
Ducted Condenser Fans	A condenser fan/motor assembly designed for optional external ducting of condenser air that provides greater pressure rise and has a higher rated motor horsepower than the condenser fan provided as a standard component with the equipment.	Test with the ducted condenser fan installed and operating using zero external static pressure, unless the manufacturer specifies use of an external static pressure greater. than zero, in which case, use the manufacturer-specified external static pressure.
Sound Traps/Sound Attenuators.	An assembly of structures through which the supply air passes before leaving the equipment or through which the return air from the building passes immediately after entering the equipment for which the sound insertion loss is at least 6 dB for the 125 Hz octave band frequency range.	Removable sound traps/sound attenuators shall be removed for testing. Otherwise, test with sound traps/attenuators in place.
Humidifiers	A device placed in the supply air stream for moisture evaporation and distribution. The device may require building steam or water, hot water, electric or gas to operate.	Remove humidifiers for testing.
UV Lights	A lighting fixture and lamp mounted so that it shines light on the conditioning coil, that emits ultraviolet light to inhibit growth of organisms on the conditioning coil surfaces, the condensate drip pan, and/other locations within the equipment.	Remove UV lights for testing.
High-Effectiveness Indoor Air Filtration.	Indoor air filters with greater air filtration effectiveness than MERV 8 or the lowest MERV filter distributed in commerce, whichever is greater.	Test with a MERV 8 filter or the lowest MERV filter distributed in commerce, whichever is greater

2.2.3. Optional Representations. Test provisions for the determination of the metrics indicated in paragraphs (a) through (d) of this section are optional and are determined according to the applicable provisions in section 2.2.1 of this appendix. The following metrics in AHRI 920–2020 are optional:

(a) $ISMRE2_{70}$;

(b) $COP_{Full,x}$:

(c) $COP_{DOAS,x}$: and

(d) ISMRE2 and ISCOP2 for water-cooled DX–DOASes using the ''Condenser Water Entering Temperature, Chilled Water'' conditions specified in Table 4 of AHRI 920–2020 and for water-source heat pump DX–DOASes using the ''Water-Source Heat Pump, Ground-Source Closed Loop'' conditions specified in Table 5 of AHRI 920–2020.

2.3 Synonymous Terms

(a) Any references to energy recovery or energy recovery ventilator (ERV) in AHRI 920–2020 and ANSI/ASHRAE 198–2013 shall be considered synonymous with ventilation energy recovery system (VERS) as defined in § 431.92.

(b) Reserved.

[FR Doc. 2022–15493 Filed 7–26–22; 8:45 am]

BILLING CODE 6450–01–P